Rosemount 2460 System Hub







Rosemount 2460 System Hub

NOTICE

Read this manual before working with the product. For personal and system safety, and for optimum product performance, make sure you thoroughly understand the contents before installing, using, or maintaining this product.

For technical assistance, contacts are listed below:

Customer Central

Technical support, quoting, and order-related questions.

United States - 1-800-999-9307 (7:00 am to 7:00 pm CST)

Asia Pacific- 65 777 8211

Europe/ Middle East/ Africa - 49 (8153) 9390

North American Response Center

Equipment service needs.

1-800-654-7768 (24 hours—includes Canada)

Outside of these areas, contact your local Emerson Process Management representative.

AWARNING

Spare Parts

Any substitution of non-recognized spare parts may jeopardize safety. Repair, e.g. substitution of components etc, may also jeopardize safety and is under no circumstances allowed.

Rosemount Tank Radar AB will not take any responsibility for faults, accidents, etc caused by non-recognized spare parts or any repair which is not made by Rosemount Tank Radar AB.

A CAUTION

The products described in this document are NOT designed for nuclear-qualified applications. Using non-nuclear qualified products in applications that require nuclear-qualified hardware or products may cause inaccurate readings.

For information on Rosemount nuclear-qualified products, contact your local Emerson Process Management Sales Representative.

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Section 1 Introduction

1.1 Safety Messages

Procedures and instructions in this manual may require special precautions to ensure the safety of the personnel performing the operations. Information that raises potential safety issues is indicated by a warning symbol (\triangle). Refer to the safety messages listed at the beginning of each section before performing an operation preceded by this symbol.

AWARNING

Failure to follow these installation guidelines could result in death or serious injury:

- Make sure only qualified personnel perform the installation.
- Use the equipment only as specified in this manual. Failure to do so may impair the protection provided by the equipment.
- Ensure that the lid on the housing is closed during operation.

Electrical shock could cause death or serious injury:

 Use extreme caution when making contact with the leads and terminals.

▲ WARNING

Any substitution of non-recognized parts may jeopardize safety. Repair, e.g. substitution of components etc., may also jeopardize safety and is under no circumstances allowed.

1.2 Symbols



The CE marking symbolises the conformity of the product with the applicable European Community Directives.



Protective Earth



Ground



Caution - see reference manual

1.3 Section Overview

The sections in this manual provide information on installing, operating, and maintaining the Rosemount 2460. The sections are organized as follows:

Section 2: Overview

- Components
- System overview
- Installation procedure

Section 3: Installation

- Installation considerations
- Mechanical installation
- Electrical installation

Section 4: Configuration

Setting up a 2460 System Hub

Section 5: Operation

Description of Light Emitting Diodes (LED)

Section 6: Service and Troubleshooting

- Tools
- Troubleshooting
- Service instructions

Appendix A: Specifications and Reference Data

- Specifications
- Dimensional drawings
- Ordering table

1.4 Technical Documentation

The Rosemount Tank Gauging System includes the following documentation:

- Rosemount 2460 System Hub Product Data Sheet (00813-0100-2460)
- Raptor System Data Sheet (704010EN)
- Rosemount 2410 Reference Manual (300530EN)
- Rosemount 5900S Reference Manual (00809-0100-5900)
- Rosemount 2240S Reference Manual (00809-0100-2240)
- Rosemount 2230 Reference Manual (00809-0100-2230)
- Raptor System Configuration Manual (300510EN)
- Rosemount 2410 Product Data Sheet (00813-0100-2410)
- Rosemount 5900S Product Data Sheet (00813-0100-5900)
- Rosemount 5900C Product Data Sheet (00813-0100-5901)
- Rosemount 2240S Product Data Sheet (00813-0100-2240)
- Rosemount 2230 Product Data Sheet (00813-0100-2230)
- Rosemount 5300 Product Data Sheet (00813-0100-4530)
- Rosemount 5400 Product Data Sheet (00813-0100-4026)
- Rosemount 5300 Series Reference Manual (00809-0100-4530)
- Rosemount 5400 Series Reference Manual (00809-0100-4026)
- Rosemount TankMaster WinOpi Reference Manual (303028EN)
- Rosemount Tank Gauging Installation Drawings

1.5 Service support

For service support contact the nearest *Emerson Process Management/Rosemount Tank Gauging* representative. Contact information can be found on the web site www.rosemount-tg.com.

1.6 Product recycling/ disposal

Recycling of equipment and packaging should be taken into consideration and disposed of in accordance with local and national legislation/regulations.

1.7 Packing Material

Rosemount Tank Radar AB is fully certified according to ISO 14001 environmental standards. By recycling the corrugated paperboard, or wooden boxes, used for shipping our products you can contribute to take care of the environment.

1.7.1 Reuse and Recycling

Experience has shown that wooden boxes can be used several times for various purposes. After careful disassembly the wooden parts may be reused. Metal waste may be converted.

1.7.2 Energy recovery

Products which have served their time may be divided into wood and metal components and the wood can be used as fuel in sufficient ovens.

Due to its low moisture content (approximately 7%) this fuel has a higher calorific value than ordinary wood fuel (moisture content approximately 20%).

When burning interior plywood the nitrogen in the adhesives may increase emissions of nitrogen oxides to the air 3-4 times more than when burning bark and splinter.

Note!

Landfill is not a recycling option and should be avoided.

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Section 2 Overview

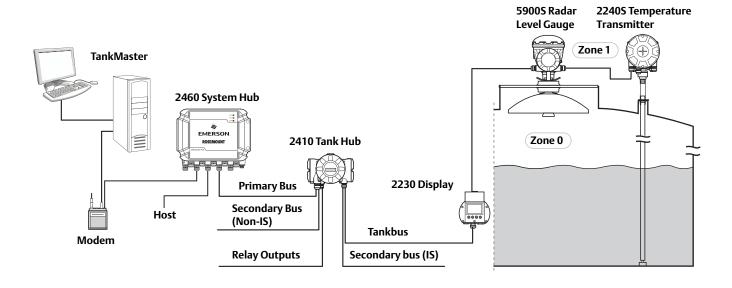
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Components
System Overviewpage 13
Installation Procedurepage 20

2.1 Introduction

In a typical Rosemount Tank Gauging system, a Rosemount 2460 System Hub is used to collect measurement data and status information from various field devices. A standard installation includes a 2460 System Hub connected to a number of Rosemount 2410 Tank Hubs which collect measurement data and status information from the field devices.

The 2460 buffers measurement data and status information from one or more tanks, and sends the information to a TankMaster PC, or other host system, whenever the 2460 receives a request for data.

Figure 2-1. System integration



2.1.1 Communication

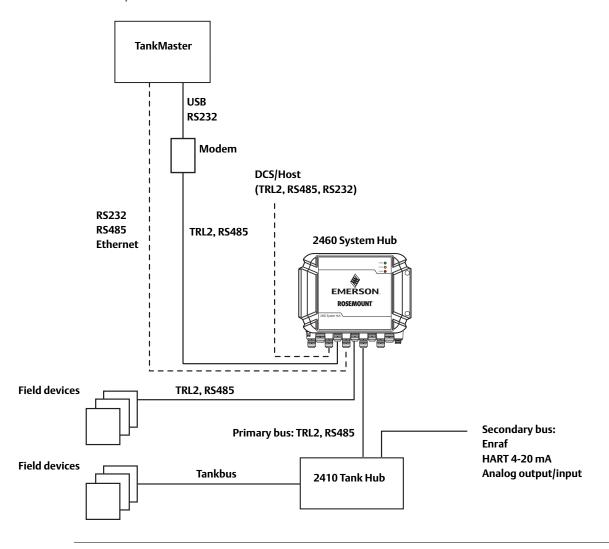
The Rosemount Tank Gauging system supports various communication interfaces between field devices and a TankMaster PC or other host computer as illustrated in Figure 2-2.

The Rosemount 2460 System Hub collects measurement data from field devices and transmits the data to a host system. It also handles communication from a host to the field devices.

The 2460 supports a number of communication interface standards. For host communication, the TRL2, RS485, and RS232 are supported. TRL2 and RS485 are supported for field device communication also, as well as other standards such as Enraf.

The Rosemount 2410 Tank Hub has a Primary bus and a Secondary bus that can be used for TRL2 Modbus (standard) or RS485 Modbus communication⁽¹⁾. The Secondary bus supports other communication protocols as well, such as Enraf, Varec etc.

Figure 2-2. Typical configuration of a 2460 System Hub connected to a Rosemount 2410 and a PC/Host



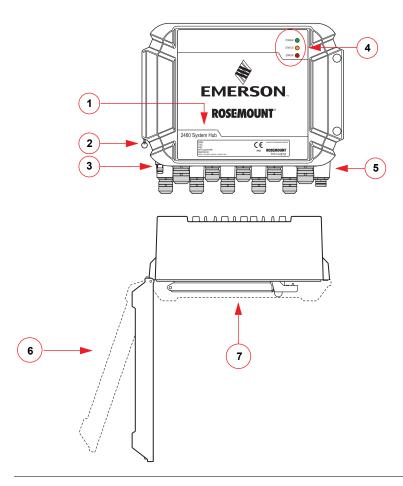
2.2 Components

This section shows the various parts of the 2460 System Hub.

Note!

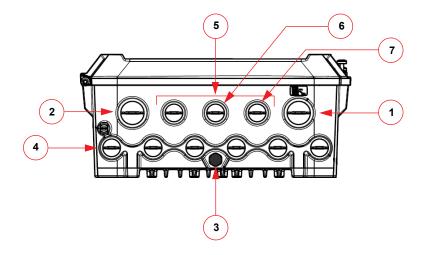
The 2460 System Hub is designed for use in non-hazardous areas.

Figure 2-3. The 2460 System Hub front and top view



- 1. Main label
- 2. Locking ring for securing lid
- 3. External ground terminal (M5 screw, flat, lug dimension max. 10 x 4 mm), page 27, page 36
- 4. Light Emitting Diodes (LED) for status and error messages, page 62
- 5. Cable entries (Nine (9) M20 x 1.5, Two (2) M25 x 1.5), page 27
- 6. Lid (can be removed by removing the locking ring)
- 7. Terminal compartment with communication boards and ports

Figure 2-4. Cable entries



- 1. Cable entry M25 (power)
- 2. Cable entry M25
- 3. Membrane
- 4. Cable entries (6 x M20 x 1.5)
- 5. Cable entries (3 x M20 x 1.5)
- 6. Cable entry for Ethernet connection ETH 1
- 7. Cable entry for Ethernet connection ETH 2

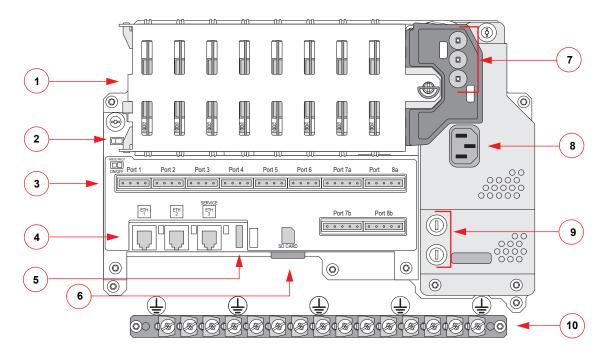


Figure 2-5. Inside the 2460 System Hub

- 1. Communication boards
- 2. Write protection switch
- 3. Terminal block / ports (1 to 8)
- 4. Ethernet ports
- 5. USB port
- 6. SD memory card reader
- 7. LEDs (power=green, status=yellow, error=red)
- 8. Power input
- 9. Fuses
- 10. Ground bar⁽¹⁾ (Note! For signal/shield wire ground only.)

2.2.1 System Hub Enclosure

The 2460 System Hub is designed with a weather protected, wall-mounted box.

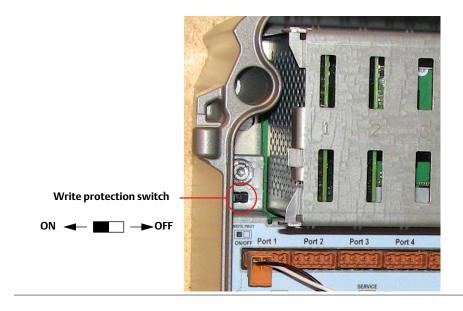
Figure 2-6. Enclosure



2.2.2 Write Protection Switch

The 2460 System Hub is equipped with a write protection switch for preventing unauthorized changes of the 2460 configuration database.

Figure 2-7. Write protection



In addition to the switch, the 2460 supports software write protection as described in "Software Write Protection" on page 95.

2.3 System Overview

The Rosemount Tank Gauging system is a state-of-the art inventory and custody transfer radar tank level gauging system. It is developed for a wide range of applications at refineries, tank farms and fuel depots, and fulfills the highest requirements on performance and safety.

The field devices on the tank communicate over the intrinsically safe *Tankbus*. The Tankbus is based on a standardized fieldbus, the FISCO⁽¹⁾ FOUNDATION™ fieldbus, and allows integration of any device supporting that protocol. By utilizing a bus powered 2-wire intrinsically safe fieldbus the power consumption is minimized. The standardized fieldbus also enables integration of other vendors' equipment on the tank.

The Rosemount Tank Gauging product portfolio includes a wide range of components to build small or large customized tank gauging systems. The system includes various devices, such as radar level gauges, temperature transmitters, and pressure transmitters for complete inventory control. Such systems are easily expanded thanks to the modular design.

The Rosemount Tank Gauging system is a versatile system that is compatible with and can emulate all major tank gauging systems. Moreover, the well-proven emulation capability enables step-by-step modernization of a tank farm, from level gauges to control room solutions.

It is possible to replace old mechanical or servo gauges with modern Rosemount Tank Gauging devices, without replacing the control system or field cabling. It is further possible to replace old HMI/SCADA-systems and field communication devices without replacing the old gauges.

There is a distributed intelligence in the various system units which continuously collect and process measurement data and status information. When a request for information is received an immediate response is sent with updated information.

The flexible Rosemount Tank Gauging system supports several combinations to achieve redundancy, from control room to the different field devices. Redundant network configuration can be achieved at all levels by doubling each unit and using multiple control room work stations.

(1) See documents IEC 61158-2 and IEC/TS 60079-27

Figure 2-8. Rosemount Tank Gauging system architecture

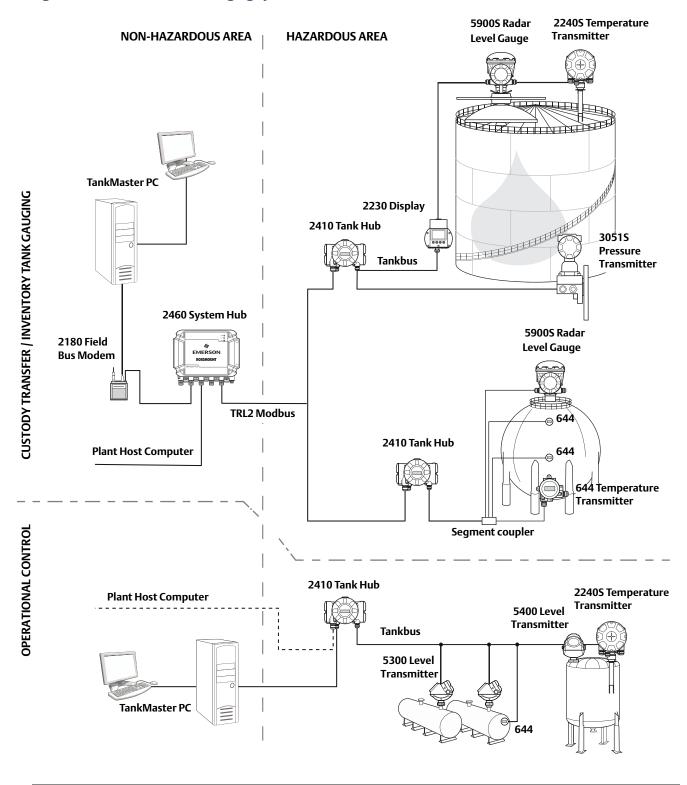
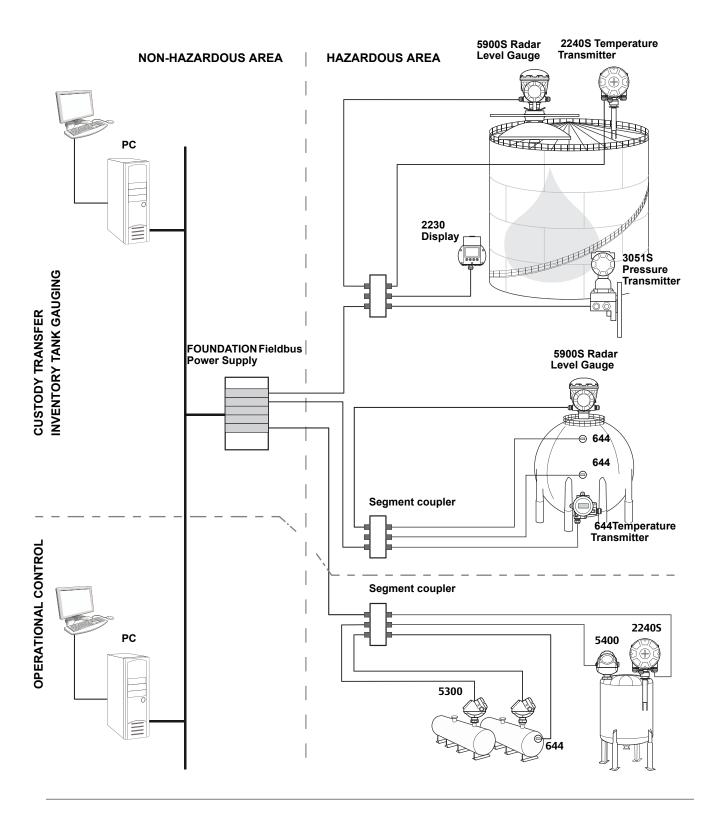


Figure 2-9. Rosemount Tank Gauging system architecture for wireless systems

NON-HAZARDOUS AREA HAZARDOUS AREA 2240S Temperature Transmitter 5900S Radar Level Gauge THUM ((((TankMaster PC 2230 Display 2410 Tank Hub 3051S Pressure **Transmitter Smart Wireless Tankbus** Gateway 5900S Radar Level Gauge 2410 Tank Hub _{-⊜} 644 644Temperature Transmitter Segment coupler

Figure 2-10. Rosemount Tank Gauging system architecture in a Foundation fieldbus network



TankMaster HMI Software

TankMaster is a powerful Windows-based Human Machine Interface (HMI) for complete tank inventory management. It provides configuration, service, set-up, inventory, and custody transfer functions for Rosemount Tank Gauging systems and other supported instruments.

TankMaster is designed to be used in the Windows 7 and Microsoft Windows Server 2008 environment providing easy access to measurement data from your Local Area Network (LAN).

The *TankMaster WinOpi* program lets the operator monitor measured tank data. It includes alarm handling, batch reports, automatic report handling, historical data sampling as well as inventory calculations such as Volume, Observed Density and other parameters. A plant host computer can be connected for further processing of data.

The *TankMaster WinSetup* program is a graphical user interface for installation, configuration and service of devices in the Rosemount Tank Gauging system.

Rosemount 2460 System Hub

The 2460 System Hub is a data concentrator that continuously polls and stores data from field devices such as radar level gauges and temperature transmitters in a buffer memory. Whenever a request for data is received, the 2460 can immediately send data from a group of tanks from the updated buffer memory.

Rosemount 2410 Tank Hub

The Rosemount 2410 Tank Hub acts as a power supply to the connected field devices in the hazardous area using the intrinsically safe Tankbus.

The 2410 collects measurement data and status information from field devices on a tank. It has two external buses for communication with various host systems.

There are two versions of the 2410; one for single tank operation and one for multiple tanks operation. The 2410 multiple tanks version supports up to 10 tanks and 16 devices. With the Rosemount 5300 and 5400 level transmitters the 2410 supports up to 5 tanks.

The 2410 is equipped with two relays which support configuration of up to 10 "virtual" relay functions allowing you to specify several source signals for each relay.

The 2410 supports Intrinsically Safe (IS) and Non-Intrinsically Safe (Non-IS) analog 4-20 mA inputs/outputs. By connecting a Smart Wireless THUM Adapter to the IS HART 4-20 mA output, the 2410 is capable of wireless communication with a Smart Wireless Gateway in a WirelessHART network.

Rosemount 5900S Radar Level Gauge

The Rosemount 5900S Radar Level Gauge is an intelligent instrument for measuring the product level inside a tank. Different antennas can be used in order to meet the requirements of different applications. The 5900S can measure the level of almost any product, including bitumen, crude oil, refined products, aggressive chemicals, LPG and LNG.

The Rosemount 5900S sends microwaves towards the surface of the product in the tank. The level is calculated based on the echo from the surface. No part of the 5900S is in actual contact with the product in the tank, and the antenna is the only part of the gauge that is exposed to the tank atmosphere.

The 2-in-1 version of the 5900S Radar Level Gauge has two radar modules in the same transmitter housing allowing two independent level measurements using one antenna and one tank opening.

Rosemount 5300 Guided Wave Radar

The Rosemount 5300 is a premium 2-wire guided wave radar for level measurements on liquids, to be used in a wide range of medium accuracy applications under various tank conditions. Rosemount 5300 includes the 5301 for liquid level measurements and the 5302 for liquid level and interface measurements.

Rosemount 5400 Radar Level Transmitter

The Rosemount 5400 is a reliable 2-wire non-contact radar level transmitter for liquids, to be used in a wide range of medium accuracy applications under various tank conditions.

Rosemount 2240S Multi-Input Temperature Transmitter

The Rosemount 2240S Multi-input Temperature Transmitter can connect up to 16 temperature spot sensors and an integrated water level sensor.

Rosemount 2230 Graphical Field Display

The Rosemount 2230 Graphical Field Display presents inventory tank gauging data such as level, temperature, and pressure. The four softkeys allow you to navigate through the different menus to provide all tank data, directly in the field. The Rosemount 2230 supports up to 10 tanks. Up to three 2230 displays can be used on a single tank.

Rosemount 644 Temperature Transmitter

The Rosemount 644 is used with single spot temperature sensors.

Rosemount 3051S Pressure Transmitter

The 3051S series consists of transmitters and flanges suitable for all kinds of applications, including crude oil tanks, pressurized tanks and tanks with / without floating roofs.

By using a 3051S Pressure Transmitter near the bottom of the tank as a complement to a 5900S Radar Level Gauge, the density of the product can be calculated and presented. One or more pressure transmitters with different scalings can be used on the same tank to measure vapor and liquid pressure.

Rosemount 2180 Field Bus Modem

The Rosemount 2180 Field Bus Modem (FBM) is used for connecting a TankMaster PC to the TRL2 communication bus. The 2180 is connected to the PC using either the RS232 or the USB interface.

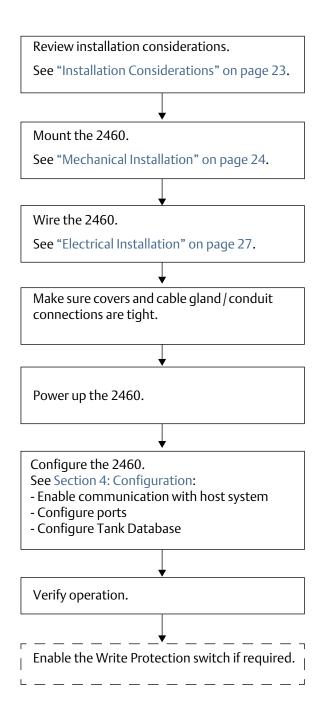
Rosemount Smart Wireless Gateway and Rosemount Smart Wireless THUM Adapter

A THUM Adapter allows wireless communication between a 2410 Tank Hub and a Smart Wireless Gateway. The gateway is the network manager that provides an interface between field devices and the TankMaster inventory software or host / DCS systems.

See the *Raptor Technical Description* (Document no. 704010en) for more information on the various devices and options.

2.4 Installation Procedure

Follow these steps for a proper installation:



Section 3 Installation

Section Overviewpa	ige 21
Safety Messagespa	ige 21
Installation Considerationspa	ige 23
Mechanical Installationpa	ige 24
Electrical Installationpa	ige 27

3.1 Section Overview

The information in this section covers installation considerations for the Rosemount 2460.

3.2 Safety Messages

Procedures and instructions in this section may require special precautions to ensure the safety of the personnel performing the operation. Information that raises potential safety issues is indicated by a warning symbol (\triangle) . Refer to the following safety messages before performing an operation preceded by this symbol.

AWARNING

Failure to follow safe installation and servicing guidelines could result in death or serious injury:

Make sure only qualified personnel perform the installation.

Use the equipment only as specified in this manual. Failure to do so may impair the protection provided by the equipment.

Do not perform any service other than those contained in this manual unless you are qualified.

AWARNING

High voltage that may be present on leads could cause electrical shock:

Avoid contact with leads and terminals.

Make sure the main power to the 2460 System Hub is off and the lines to any other external power source are disconnected or not powered while wiring the 2460.

AWARNING

Electrical shock could cause death or serious injury:

Use extreme caution when making contact with the leads and terminals.

ACAUTION

Make sure that there is no water or snow on top of the lid when it is opened. This may damage the electronics inside the housing.

ACAUTION

Be careful when opening the lid in very low temperatures. High humidity and temperatures far below the freezing point may cause the gasket to get stuck to the lid. In that case you may use a heating fan to warm the housing in order to release the gasket. Be careful not to use excess heat which may damage the housing and electronics.

3.3 Installation Considerations

The Rosemount 2460 may be installed on various non-hazardous locations at the plant.

In case the 2460 is exposed to long periods of sunshine, a sunshade should be used to prevent the 2460 System Hub from being heated to temperatures above the maximum operating temperature.

Ensure that environmental conditions are within specified limits as listed in Appendix A: Specifications and Reference Data.

Ensure that the Rosemount 2460 is installed such that it is not exposed to higher pressure and temperature than specified in Appendix A: Specifications and Reference Data.

Do not install the Rosemount 2460 in non-intended applications, for example environments where it may be exposed to extremely intense magnetic fields or extreme weather conditions.

Use an external circuit breaker in order to make sure that power supply can be safely disconnected when wiring and servicing the Rosemount 2460 System Hub. The circuit breaker shall be easily accessible and appropriately labeled.

It's a good idea to make a plan of the installation in order to ensure that all components in the system are properly specified. The plan should include the following:

- suitable locations for devices
- power budget
- cabling and connections (for example whether devices will be "daisy-chained" or not)
- specification of cable glands for the various devices
- location of terminators on the Tankbus (2410 Tank Hub)
- identification codes such as Unit ID/Device ID of each device
- assigned Modbus addresses for level gauges and other field devices to be stored in the Tank Databases⁽¹⁾ of the 2410 Tank Hub and 2460 System Hub

See "Electrical Installation" on page 27 for more information on cables and glands.

Important

Check the 2460 System Hub for any signs of damage prior to installation. Ensure that O-rings and gaskets are in good condition.

Important

Ensure that the communication boards have not come loose during transportation.

⁽¹⁾ See the Raptor System Configuration manual (document no. 300510 and the Rosemount 2410 Tank Hub Reference Manual (document no. 3005030) for more information

3.4 Mechanical Installation

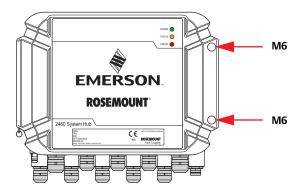
See also Mechanical Installation Drawing D7000001-927 for further information.

The housing of the Rosemount 2460 is designed with four holes for attaching the 2460 to a wall using four screws.

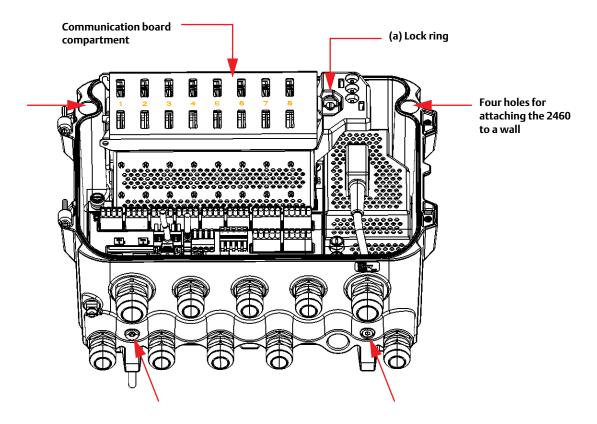
Note!

Ensure that the 2460 is installed to minimize vibration and mechanical shock.

- 1. Mark the positions of the four screws to be used for attaching the 2460 to the wall. A mounting template (see Figure 3-1 on page 26) is shipped with the 2460 which may be used for this purpose.
- 2. Drill four holes with appropriate size to fit screw diameter 6 mm.
- 3. Loosen the two screws (M6 x 2) on the 2460 housing that keep the lid in closed position and open the lid.



4. Attach the 2460 to the wall. There are four holes on the housing to be used for the screws. The required screw dimension is given by Figure 3-2 on page 26.



5. Ensure that the Lock ring (a) on the cover to the communication board compartment is folded so that it does not prevent the lid from being properly closed. Close the lid and ensure that it is fully engaged to prevent water from entering the terminal compartment. Torque the two screws to 4Nm (35 in.-lb).

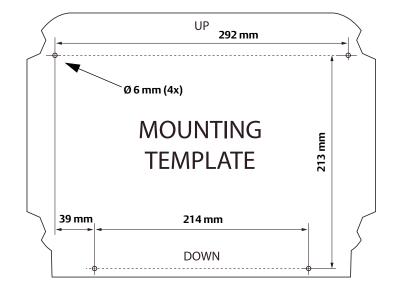
Installation 25

 \triangle

November 2014

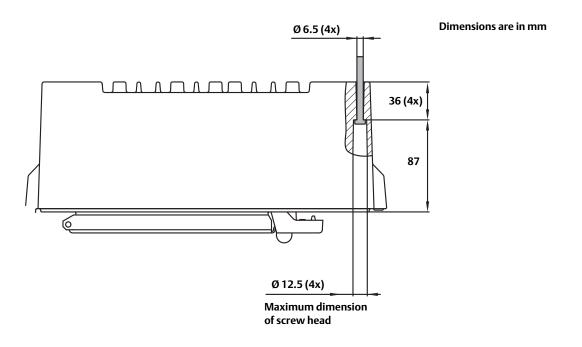
A mounting template is shipped with the 2460 which can be used to mark the position of the holes as illustrated in Figure 3-1.

Figure 3-1. Mounting template with hole pattern for the 2460 System Hub



Make sure that the four screws meet the specifications given in Figure 3-2.

Figure 3-2. 2460 System Hub dimensions



3.5 Electrical Installation

See Electrical Installation Drawing D7000001-928 for further information.

3.5.1 Cable Entries

The Rosemount 2460 housing has nine M20 x 1.5 and two M25 x 1.5 entries. The connections must be made in accordance with local or plant electrical codes.

Make sure that unused cable entries are properly sealed to prevent moisture or other contamination from entering the terminal board compartment of the electronics housing.

Note!

Use the enclosed metal plugs to seal unused cable entries in order to achieve required level of ingress protection. The plastic plugs mounted at delivery are not sufficient as seal!

Note!

It is recommended that a sealant of type PTFE is used to prevent water ingress and to enable future removal of the plug/gland.

3.5.2 Power Supply

The Rosemount 2460 System Hub accepts supply voltage 100 - 250 Vac (50/60 Hz) and 24 - 48 Vdc.

3.5.3 Cable Selection for Power Supply

Appropriate cross sectional area of wires must be used in order to prevent a high voltage drop to the connected device. Recommended cable size is $0.75~\rm mm^2$ to $2.0~\rm mm^2$ (18 AWG to 14 AWG) in order to minimize the voltage drop.

3.5.4 Grounding

The housing should always be grounded in accordance with national and local electrical codes. Failure to do so may impair the protection provided by the equipment. The most effective grounding method is direct connection to earth ground with minimal impedance. There are grounding screw connections inside the terminal compartments which are identified by ground symbols: $\bigoplus / \frac{1}{2}$. There is also a grounding screw on the housing.

The System Hub ground bar (see Figure 2-5 on page 11) shall only be used for connecting signal related ground wires, eg shield ground connections from the field bus harness. The protective earth ground connection shall be connected to the System Hub via the dedicated power board IEC plug and the external grounding screw on the housing.

Connect shield to ground at one end only, otherwise a ground loop may occur.

Note

Grounding the device via threaded conduit connection may not provide sufficient ground.

3.5.5 Cabling for the TRL2/RS485 Bus

In a Rosemount Tank Gauging system a Rosemount 2460 System Hub communicates with a TankMaster control room PC using the TRL2/RS485 Modbus protocol, see Section 2: Overview.

TRL2 Bus

The TRL2 bus requires twisted and shielded pair wiring with a minimum cross-sectional area of 0.50 mm² (AWG 20 or similar). The maximum length of the TRL2 bus is approximately 4 km (13000 ft). The TRL2 field bus can normally use existing cables in the tank area.

Cable cross-sectional area for the TRL2 wiring should follow the recommendations in Table 3-1:

Table 3-1. Minimum cable area for the TRL2 bus

Maximum distance	Cross-sectional area	
	Minimum	Maximum
3 km	0.50 mm ² (AWG 20)	2.5 mm ²
4 km	0.75 mm ² (AWG 18)	2.5 mm ²

Figure 3-3. Individually shielded pair cables minimizes crosstalk



Table 3-2 shows typical cable types that can be used for connecting the TRL2 bus. Other cables of similar type may also be used.

Table 3-2. Recommended cable standards for the TRL2 bus

Туре	Manufacturing standard	Core size	
Signal	BS 5308 part 1, type 1	1 mm ²	
Signal (armoured)	BS 5308 part 2, type 1	1 mm ²	

RS485 Bus

The RS485 bus should meet the following requirements:

- twisted and shielded pair wiring
- characteristic impedance of 120 Ω
- maximum cable length 1200 m / 4000 ft.

3.5.6 Connecting the 2460 System Hub

Connection to a Host

The 2460 System Hub can be connected to TankMaster or other host computer via a Rosemount 2180 Field Bus Modem (FBM). The 2460 also supports the RS232 and RS485 interfaces for connecting to a host. The Ethernet interface can be used to connect the 2460 to a service PC.

The TRL2 Bus requires a twisted and shielded pair with a cross-sectional area of 0.50 to $2.5 \, \text{mm}^2$ (AWG 20 to 14).

For RS232 communication, wiring cross-sectional area must be at least 0.25 mm² (AWG 24 or similar). The maximum length of the RS232 connection is 30 m at baude rate 4800.

Table 3-3. Data rate and mximum distances for RS232 communication

Baude rate (bps)	Distance (m)
2400	60
4800	30
9600	15
19200	7.6

Communication Ports

The 2460 System Hub has eight slots for communication interface boards. It is equipped with interface boards for field device communication and host communication. The specific configuration is specified in the ordering information.

Port 8 is used for TankMaster communication. Port 7 is used for host or TankMaster communication as specified in the ordering information.

Port 1 to Port 4 are used for field device communication.

Ports 5 and 6 can be used for host or field device communication as specified in the ordering information. This allows you to vary the number of field and host ports depending on the specific requirements.

Table 3-4 below shows various configuration options for a 2460 System Hub.

Table 3-4. Port configuration options

Ports	1	2	3	4	5	6	7	8
Alternative 6+2	Field	Field	Field	Field	Field	Field	Host	Host
	Port	Port	Port	Port	Port	Port	Port	Port
Alternative 5+3	Field	Field	Field	Field	Field	Host	Host	Host
	Port	Port	Port	Port	Port	Port	Port	Port
Alternative 4+4	Field	Field	Field	Field	Host	Host	Host	Host
	Port	Port	Port	Port	Port	Port	Port	Port

3.5.7 Wiring

The terminal compartment has a terminal board for connecting communication buses to host systems and field devices. The terminal compartment also has a connection for power supply. Three Ethernet connections are available for LAN communication.

 \triangle

1. Ensure that the power supply is switched off. Note! If any uncertainty exists whether power supply is off or not, make sure that loose cable ends don't run through the cover on the Power Board.

 \triangle

- 2. Loosen the two captive screws and open the lid (see Figure 3-4). Note! The lid can be removed from the housing for easier access when open more than 25°. To remove the lid, remove the locking ring and carefully slide the lid upwards 21 mm or more. Be careful not to drop it on the floor.
- 3. Run wires through the cable gland.
- 4. Connect wires to the terminal block. See Figure 3-5 on page 31 and Table 3-5 on page 32 for information on the terminal block connections. See also Figure 3-13 on page 40 for example of how to connect the 2460 to host systems and field devices.
- 5. Use the enclosed metal plugs to seal any unused entries.

 \triangle

6. Tighten the conduits/cable glands.

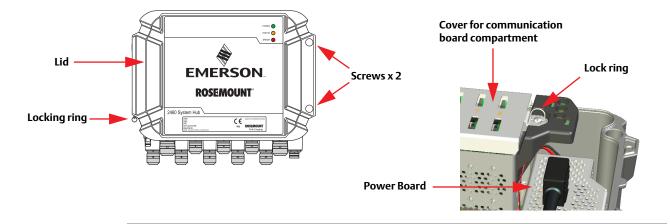
 \triangle

7. Make sure that the Lock ring on the cover to the communication board compartment is folded so that it does not prevent the lid from being properly closed. Attach and close the lid. Torque the two screws to 4Nm (35 in.-lb). Ensure that it is fully engaged to prevent water from entering the terminal compartment.

Note!

Ensure that gasket and seats are in good condition prior to mounting the cover in order to maintain the specified level of ingress protection. The same requirements apply for cable inlets and outlets (or plugs). Cables must be properly attached to the cable glands.

Figure 3-4. 2460 front view



3.5.8 Terminal Board and Ports

Figure 3-5. Ports and terminals

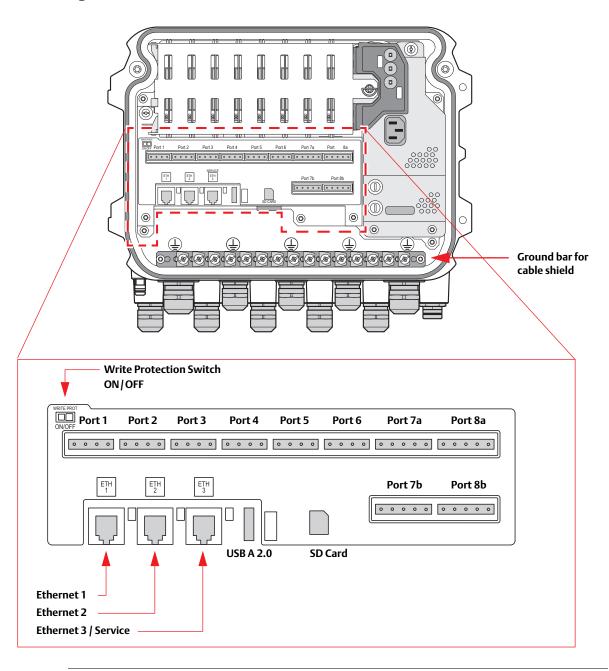


Table 3-5. Terminal assignment

Terminal	Designation	Function
Port 1		
Port 2	Field device	Communication bus for field devices. Supports electrical interface TRL2 and RS485.
Port 3	Field device	See "Digital Communication Protocols" on page 103 for more information.
Port 4		illoithation.
Port 5	Field device/Host	Port 5 and 6 can be configured for field or host communication (see
Port 6	rieid device/nost	"Communication Ports" on page 29 for more information).
Port 7a		Communication bus for host. Ports designated "a" and "b" are
Port 7b	Host/TankMaster	connected in parallel. Supports electrical interface TRL2, RS485, RS422, and RS232. See "Digital Communication Protocols" on page 103 for more information.
Port 8a	TankMaster	Communication bus for TankMaster.
Port 8b	rankwaster	Ports designated "a" and "b" are connected in parallel. Supports electrical interface TRL2, RS485, RS422, and RS232.
ETH 1	Standard	Ethernet communication bus.
ETH 2	Ethernet port	Ethernet communication bus.
ETH 3	Service	Ethernet communication bus for service purposes. Use this port to access the Web interface for the 2460 (see "Using the Web Interface" on page 80).
USB A 2.0	USB	Port for USB stick. Can be used for saving log files.
SD card	SD	Memory card reader for saving log files.
Ground bar		For connection of cable shields.

Figure 3-6. Pin mapping for 4 pole and 5 pole connectors

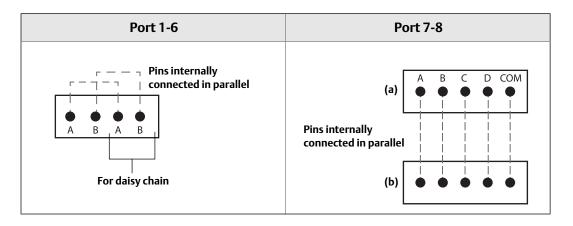


Table 3-6. Bus connections to Port 1 - 6

	Α	В	Α	В
TRL2	(A and B polarity independent)		lent)	
RS485 (2-wire) Internal reference to signal ground	А	В	А	В

Table 3-7. Bus connections to Port 7-8

	Α	В	С	D	Common
TRL2	(A and B independ	polarity dent)	N/A	N/A	N/A
RS485 / 422 (2-wire)	А	В	N/A	N/A	GND
RS485 / 422 (4-wire)	RD (A)	RD (B)	TD (A)	TD (B)	GND
RS232	RxD	TxD	N/A	N/A	GND

Table 3-8. Cables suitable for terminal blocks supplied by manufacturer

Conductor connection	Maximum (mm²)	AWG
Solid	4	11
Flexible	2.5	13
Flexible, Ferrule with plastic collar	1.5	16

Figure 3-7. Conductor stripping length and cross-sectional area

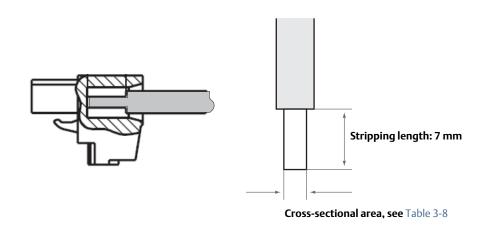


Figure 3-8. Stripping length for connection to ground bar

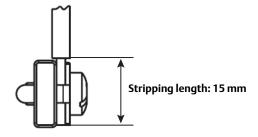


Figure 3-9. Cable entries with glands and external ground

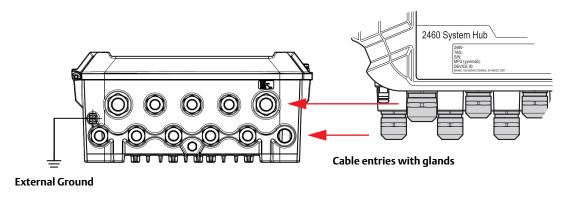


Table 3-9. Tightening torque for glands supplied by Emerson Process Management

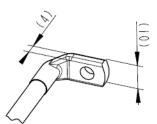
Tightening Torque (Nm)				
Thread				
	M20 M25			
Body	7	10		
Top Nut	4	7		

Table 3-10. Cable diameter for glands

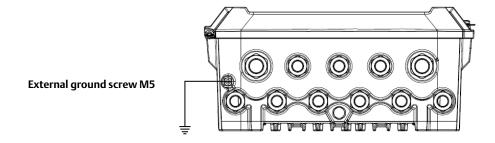
Cable Diameter (mm)			
	Thread		
	M20 M25		
Cable Ø	6 - 13	9 - 17	

3.5.9 Ground Lug

Figure 3-10. Ground lug dimensions



External ground screw M5 Cable lug thickness maximum 4 mm Cable lug hieight maximum 10 mm Cable size minimum 4 mm² or AWG 11



3.5.10 Power Supply

The Rosemount 2460 System Hub supports the following power supply:

24 - 48 Vdc, 100 - 250 Vac 50/60 Hz.

NOTE!

The 2460 is polarity insensitive for DC voltage input.

Figure 3-11. Power supply connection

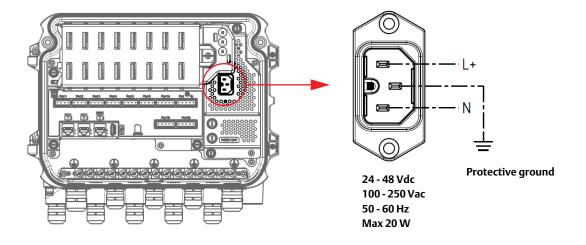


Figure 3-12. Power connector supplied by Emerson Process Management

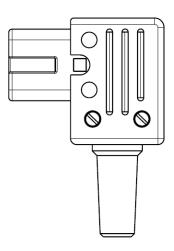


Table 3-11. Torque values for power connector assembly

	Max torque
Terminals	0.8 Nm
Cable clamp	1.2 Nm
Cover	1.2 Nm

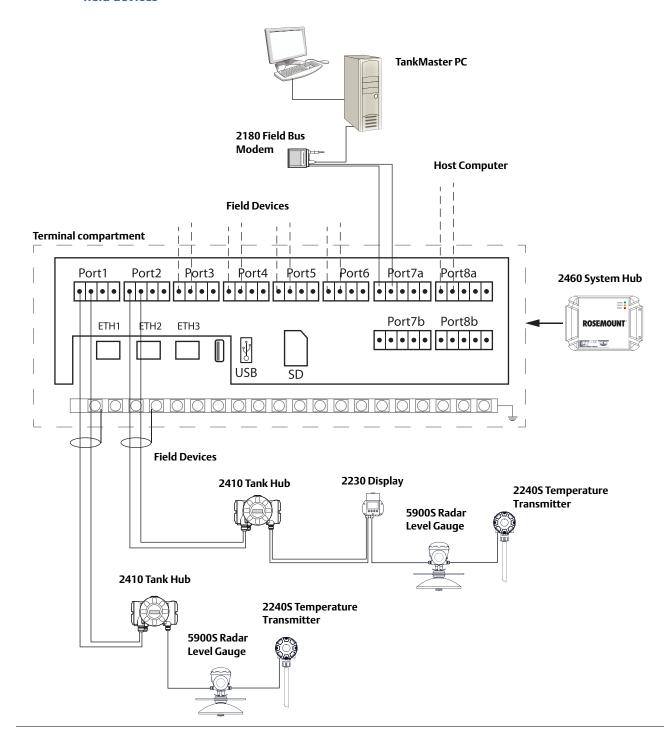
Table 3-12. Cable and wire size for power cord

Power cord connector supplied by manufacturer			
Wire (x3) Max. 2.1 mm ²			
Cable Max. 10 mm			

3.5.11 Wiring Diagram

The communication ports can be configured for various combinations of field device and host communication (see Table 3-4 on page 29). In the standard configuration Port1 to Port 6 are connected to field devices and Port 7 and Port 8 are used for host communication. See also Table 3-5 on page 32.

Figure 3-13. Example of a wiring diagram for a 2460 System Hub connected to a TankMaster PC and various field devices



Note that the actual Port configuration may differ from the example above. See "Connecting the 2460 System Hub" on page 29 for more information on configuration options for the Field and Host ports.

Section 4 Configuration

Overview	• • • • • • • • • • • • • • • •	page 41
Safety Messages		
Setting Up a 2460 System Hub	• • • • • • • • • • • • • • • • • •	page 42

4.1 Overview

This section contains information on how to setup a Rosemount 2460 System Hub in a Rosemount Tank Gauging System. The description is based on using the *TankMaster Winsetup* configuration program.

4.2 Safety Messages

Procedures and instructions in this section may require special precautions to ensure the safety of the personnel performing the operations. Information that raises potential safety issues is indicated by a warning symbol (\bigwedge). Refer to the following safety messages before performing an operation preceded by this symbol.

A WARNING

Failure to follow safe installation and servicing guidelines could result in death or serious injury:

Make sure only qualified personnel perform the installation.

Use the equipment only as specified in this manual. Failure to do so may impair the protection provided by the equipment.

Do not perform any service other than those contained in this manual unless you are qualified.

4.3 Setting Up a 2460 System Hub

4.3.1 Introduction

A Rosemount 2460 System Hub can easily be installed and configured by using the *TankMaster Winsetup* configuration program. The WinSetup installation wizard guides you through the basic configuration needed for starting up a Rosemount 2460.

See the *Raptor System Configuration Manual* (Document no. 300510) for more information on using the TankMaster WinSetup software to configure a Rosemount Tank Gauging system and a Rosemount 2460 System Hub.

Installation of a Rosemount 2460 System Hub in a Rosemount Tank Gauging system includes the following basic steps:

- 1. Specify device type and name tag.
- 2. Enable communication with the host computer/TankMaster PC.
- 3. Configure the ports for communication with TankMaster work stations or other host systems, and devices such as the Rosemount 2410 Tank Hub, and the Rosemount 5900S Radar Level Gauge.
- 4. Configure the Tank Database.

Configuration examples that illustrate how the 2460 Tank Database is related to the Tank Database of a 2410 Tank Hub is shown in the *Raptor System Configuration Manual* (Document no. 300510).

Host System 2180 Field Bus Modem 2460 System Hub Field Port **Host Port Field Devices** 2410 Tank Hub 5900S Radar 2240S Temperature **Level Gauge** . Transmitter

Figure 4-1. Rosemount Tank Gauging system architecture

Configuration 43

2230 Display

4.3.2 Installation Procedure

To setup and configure a 2460 System Hub:

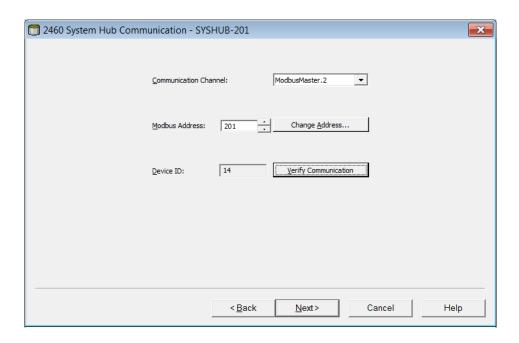
- 1. Ensure that a plan is available for all tanks and devices that specifies tag names, Modbus communication addresses, number of temperature elements and other data that is needed for a complete configuration.
- 2. Make sure that the 2460 System Hub is properly wired and up and running. Check that the Power LED is on and the Status LED indicates normal operation (see Table 5-3 on page 67).
- 3. Ensure that the *TankMaster WinSetup* program is up and running.
- 4. In WinSetup start the device installation wizard.
 - a. Click the right mouse button on the Devices folder.
 - b. Choose the *Install new* option.



- 5. Select device type:
 - a. Choose device type **2460 System Hub**.
 - b. Specify a name for the System Hub in the **2460 System Hub Tag** input field. This tag will be used as an identifier of the Rosemount 2460 in various windows and dialogs. The TankMaster program automatically suggests the first part of the name as specified in the *Tag Prefixes* window (Service>Preferences).
 - c. Click the **Next** button to continue the installation procedure with communication setup.

Step 1. Communication Setup

Verify that the correct communication protocol channel is used. A communication channel needs to be associated with a specific port (USB/COM) on the TankMaster workstation in order to establish proper communication with a connected 2460 System Hub. See "How to Check Communication Channel and Port" on page 46 for more information and Figure 4-1 on page 43.



- 2. Verify communication between the 2460 System Hub and the TankMaster PC. The 2460 can be connected to a TankMaster PC via a Rosemount 2180 Field Bus Modem, or by using a RS232 or RS485 interface.
 - a. To verify communication with the 2460 System Hub, enter the System Hub's **Modbus Address** and click the **Verify Communication** button. The Device ID will appear if the correct Modbus Address was entered (the 2460 is shipped with the default Modbus address=245).
 - b. In case you would like to change the current Modbus address, or the address is unknown, click the **Change Address on Device** button and follow the procedure as described in How to change the Modbus address of the 2460 System Hub.

Note!

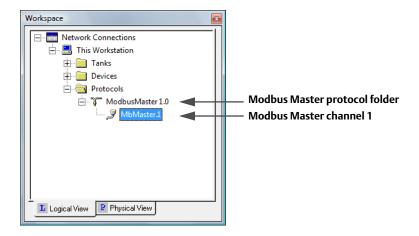
In case several 2460 System Hubs are connected using the same default address (245), you will have to change the addresses of the 2460 System Hubs before the Verify command can be used. See How to change the Modbus address of the 2460 System Hub for more information.

3. Click the **Next** button to continue the installation procedure of the 2460 System Hub.

How to Check Communication Channel and Port

To check which channels are enabled:

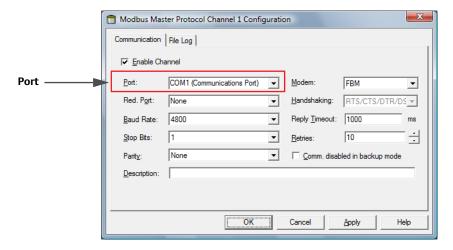
a. In the WinSetup workspace open the **Protocols** folder.



- b. Expand the master protocol folder (typically the ModbusMaster).
- c. Check that the desired channel is enabled. In the example above the Modbus Master Channel 1 is enabled. Disabled channels do not appear in the protocol folder.

To check which communication port that is associated with a certain channel:

a. Right-click the desired protocol channel icon and choose Properties.

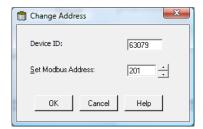


b. Open the *Communication* tab and check which communication port that is selected. This example shows that port COM1 is used for Protocol Channel 1.

See the Rosemount Raptor System Configuration Manual (Document no. 300510) for more information on how to configure communication protocols.

How to change the Modbus address of the 2460 System Hub

a. In the 2460 Communication window click the **Change Address on Device** button to open the Change Address window:



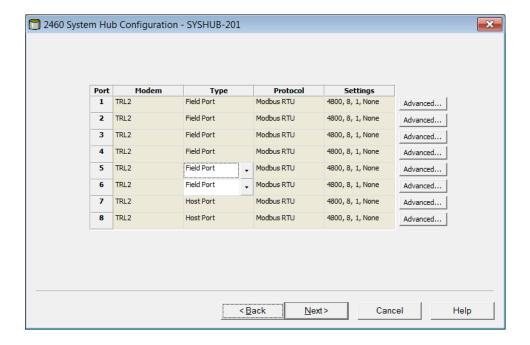
b. Enter the **Device ID** and the new **Modbus address**. For the 2460 System Hub address range 201-299 is recommended.

When changing the device address, the Device ID is used as a unique identifier of the device. The Device ID can be found on a label mounted on the device.

Tip! If there is no other device connected that uses the same address as the current device, you can find the Device ID by typing the current address into the Address field in the 2460 System Hub Communication window and clicking the **Verify Communication** button.

- c. Click the **OK** button to confirm the settings and close the *Change Address* window.
- d. In the 2460 System Hub Communication window click the **Verify Communication** button to check if communication is established between the TankMaster work station and the 2460 System Hub. The **Device ID** will appear when TankMaster finds the 2460.

Step 2. Port Configuration



- 1. Verify that the correct modem⁽¹⁾ (TRL2 or RS485) is installed and communication ports are properly configured. Normally there is no need to change any communication parameters. Standard configuration is automatically set for each modem type.
 - a. **Port Type**. The Rosemount 2460 has eight communication ports. They are normally configured as six **Field** ports and two **Host** ports. Host ports can be connected to TankMaster work stations as well as other hosts.

 The Field ports are connected to Rosemount 2410 Tank Hubs and other field devices. See also "Connecting the 2460 System Hub" on page 29.
 - b. **Protocol**. The Modbus protocol is the standard option in Rosemount Tank Gauging systems.
 - c. **Settings**. Verify the communication protocol settings. The following communication parameters are used for Rosemount 2460 Modbus communication:

Table 4-1. Modbus communication parameters for 2460 Host Ports

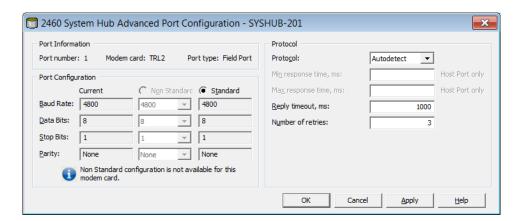
Parameter	RS485 bus	TRL2 bus	RS232
Baud rate	9600	4800	19200
Data bits per character	8	8	8
Stop bits	1	1	1
Parity	No	No	N

(1) See "Exchanging a Modem Card" on page 74 for instructions on how to change modem card.

Table 4-2. Modbus communication parameters for 2460 Field Ports

Parameter	RS485 bus	TRL2 bus
Baud rate	9600	4800
Data bits per character	8	8
Stop bits	1	1
Parity	No	No

d. (Optional). Communication parameters for Host and Field ports can be configured in the *Advanced Port Configuration* window (click the **Advanced** button):



The Advanced Port Configuration window lets you change from standard Port Configuration to a non-standard configuration. This may be a useful option if, for example, the 2460 is connected to a host that requires a lower Baud Rate than the default setting for the 2460. Non-standard settings may also be required in case the 2460 is located far away from the host since maximum communication speed for RS232 and RS485 depends on the cable length.

For Field Ports the *Reply timeout* and *Number of retries* parameters can be adjusted in case a connected field device responds slowly to queries from the Rosemount 2460. The default setting is sufficient in most cases.

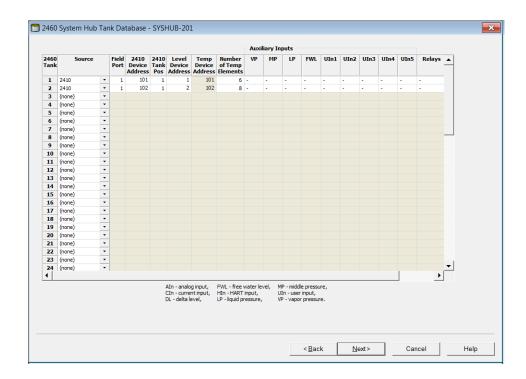
For Host Ports the *Min response time* and *Max response time* define the time slot in which a response from the Rosemount 2460 will be sent to a Host system. If needed, you may change these parameters to match the requirements for a particular host system.

Configure the desired parameters and click the OK button in the *Advanced Port Configuration* window to return to the *2460 System Hub Configuration* window.

2. In the 2460 System Hub Configuration window click the **Next** button to continue the installation procedure of the 2460 System Hub.

Step 3. Tank Database Configuration

1. Configure the Tank Database of the 2460 System Hub.



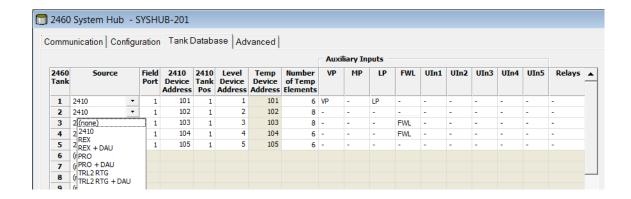
The 2460 Tank Database ensures that the 2460 System Hub requests information from all the connected field devices. It is very important that the Tank Database of the 2460 System Hub is properly configured to allow communication between the Rosemount 2460 System Hub, the 2410 Tank Hub, and field devices such as the Rosemount 5900S Radar Level Gauge, the Rosemount 2240S Multi-Input Temperature Transmitter, pressure transmitters, and other field devices supported by the 2460.

Note!

Once all devices and tanks are installed and configured, the position of a device in the Tank Database may not be changed, since this will result in corrupt mapping of tank to Tank Database position.

To configure the 2460 Tank Database:

- a. Find a free tank position (2460 Tank 1, 2, 3...) for the device to be configured.
- b. Choose the appropriate **Source** device. For a Rosemount Tank Gauging system this is typically a Rosemount 2410 Tank Hub. The 2460 System Hub also supports many other Rosemount Tank Gauging device types as well. See Table 4-3 on page 53 for more information.



- c. Select the Field Port that the device is connected to. In the standard configuration there are six field bus ports available for the 2460 System Hub. The TRL2 bus is the standard field bus interface for devices connected to a Rosemount 2460 System Hub. See "Connecting the 2460 System Hub" on page 29 for more information.
- d. Enter the **2410 Device Address** for each 2410 Tank Hub that is connected to the 2460. Note that for 2410 Tank Position 1 the same address will be used for the Temperature Device and the 2410 Tank Hub itself. This is handled automatically by TankMaster.
- e. Enter the appropriate **2410 Tank Position**. Field devices on a certain tank are associated with the same Tank Position in the Tank Database for the 2410 Tank Hub. For a 2410 connected to one tank only, all field devices are configured in Tank Position 1.

See "Single tank connected to a single 2410 Tank Hub" on page 55 for an example of how to configure a 2460 System Hub connected to 2410 Tank Hubs with one tank each.

Use Tank Position 2-10 for the multiple tanks version of the 2410 Tank Hub. It has a database with 10 tank positions that allows the 2410 to serve up to ten tanks. Each row in the Tank Database of the 2460 System Hub corresponds to a tank position in the 2410 database.

See "Multiple tanks connected to a single 2410 Tank Hub" on page 58 for an example of how to configure a 2460 connected to a 2410 with three tanks.

Important! The Tank Database of the 2460 System Hub must be properly configured to match the Tank Databases of all 2410 Tank Hubs connected to the 2460.

f. Enter **Level Device Address** for devices such as the Rosemount 5900S Radar Level Gauge and other level gauges supported by the 2460 System Hub and the 2410 Tank Hub.

g. Enter the **Temperature Device Address**. For 2410 tank position 1 the same address is used for the 2410 Tank Hub and the Temperature Device. The 2410 address is automatically copied to the Temperature Device Address field.

For 2410 tank positions 2 to 10 you will have to enter the same addresses as configured in the Tank Database of the 2410 Tank Hub. Each tank position must have a unique Temperature Device Address.

Note! In the Tank Database of the 2410 Tank Hub, this address is referred to as the *ATD Modbus* address.

See "Tank Databases of the 2460 System Hub and the 2410 Tank Hub" on page 55 for more information on how the Tank Databases of the 2460 and 2410 relate to each other.

- h. Type the number of elements in the **Number of Temperature Elements** column in case temperature elements are installed in the tank. The position of the temperature elements need to be configured in order to provide calculation of average product temperature. This is normally done as part of the standard installation procedure for the Rosemount 2410 Tank Hub and the associated temperature transmitters as described in the *Raptor System Configuration Manual* (Document no. 300510).
- i. Select the Auxiliary Inputs that are used for the device such as Free Water Level (FWL), Vapor Pressure (VP), and Liquid Pressure (LP). See Table 4-3 on page 53 for a complete list of Auxiliary Inputs.

Level Device Address

The Level Device Address field in the Tank Database of the 2460 System Hub is used for level gauges such as the Rosemount 5900S. This address also needs to be stored in the Tank Database of the 2410 Tank Hub. Normally, address configuration is done as part of the installation procedure of the Rosemount 2410 as described in the Rosemount Raptor System Configuration Manual (Document No. 300510).

Temperature Device Address

The *Temperature Device Address* in the Tank Database of the 2460 System Hub is used for all devices on a tank except level gauges. The *Temperature Device* address also needs to be stored in the Tank Database of the 2410 Tank Hub. In the 2410 this address is referred to as the *ATD Modbus* address.

Configuration of the 2410 Tank Database is normally done as part of the installation procedure of the Rosemount 2410 as described in the Rosemount Raptor System Configuration Manual (Document No. 300510).

For the first tank position in the 2410 Tank Database, the 2410 Modbus address is automatically set as the ATD Modbus address as illustrated in Figure 4-3 on page 57.

It is recommended that address range 1 to 99 is used for level gauges and 101 to 199 for ATD devices.

See "Tank Databases of the 2460 System Hub and the 2410 Tank Hub" on page 55 for more information on how to configure the databases of the 2460 System Hub and the 2410 Tank Hub.

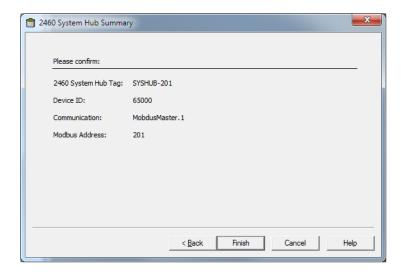
See also section "Installing a Rosemount 2410 Tank Hub" in the *Raptor System Configuration Manual* (Document No. 300510).

Tank Database entry fields for the 2460 System Hub

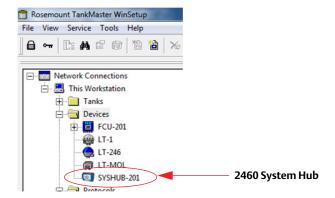
Table 4-3. Entry fields for the Tank Dabase

Tank	
Data Source Device	2410 Tank Hub, Rex, Rex + DAU, Pro, Pro + DAU, TRL2 RTG, TRL2 RTG + DAU
Field port	The field bus port that the selected device is connected to. Up to six field ports may be used.
	See "Connecting the 2460 System Hub" on page 29 for more information.
Level Device Address	The Modbus address used for the connected level device. For level gauges it is recommended that address range 1 to 99 is used.
Temperature Device Address	The Modbus address used for the connected temperature/ATD device. For Temperature devices address range 101 to 199 is recommended.
2410 Device Address	The Modbus address used for the connected 2410 Tank Hub.
Number of Temperature Elements	The number of temperature elements connected to the temperature transmitter (for example a Rosemount 2240S).
Auxiliary Inputs	Aln=Analog Input AP=Air Pressure AT=Air Temperature CIn=Current Input FWL=Free Water Level HIn=HART Input LP=Liquid Pressure MP=Middle Pressure VP=Vapor Pressure UIn=User Input Relays=Number of active relays on the 2410

Step 4. Finish the Installation



- 1. Verify that the Tag, Device ID, communication channel, and Modbus Address presented in the 2460 System Hub Summary window are correct.
- 2. In case you would like to make any changes in the preceding steps, click the Back button until the desired window appears.
- 3. Click the Finish button to confirm the installation.



- 4. Verify that the 2460 System Hub appears in the TankMaster workspace window. Now the 2460 will be able to communicate with the Host system and collect data from the field devices.
- 5. Proceed with installation and configuration of 2410 Tank Hub and field devices. See the Rosemount Tank Gauging System Configuration Manual (Document No. 300510) for more information.

Tank Databases of the 2460 System Hub and the 2410 Tank Hub

In a typical Rosemount Tank Gauging system a Rosemount 2460 System Hub collects measurement data from a number of tanks via one or more Rosemount 2410 Tank Hubs. For proper communication with the control room PC and the Rosemount TankMaster operator's interface, Modbus addresses need to be assigned to the field devices on the tank. These addresses will be stored in the tank databases of the 2460 System Hub and the 2410 Tank Hubs.

In the tank database of the 2410 Tank hub, the 2240S temperature transmitter and the 2230 display (and other non-level devices) are handled as a single **Auxiliary Tank Device** (ATD). Two Modbus addresses are used for each tank, one for the level gauge and one for the ATD. The ATD includes any supported non-level device such as the Rosemount 2240S Multi-Input Temperature Transmitter and the Rosemount 2230 Graphical Field Display. Other devices such as the Rosemount 3051S Pressure Transmitter may also be included in the ATD. The ATD Modbus address represents all these devices. Each position in the 2460 Tank Database represents one tank.

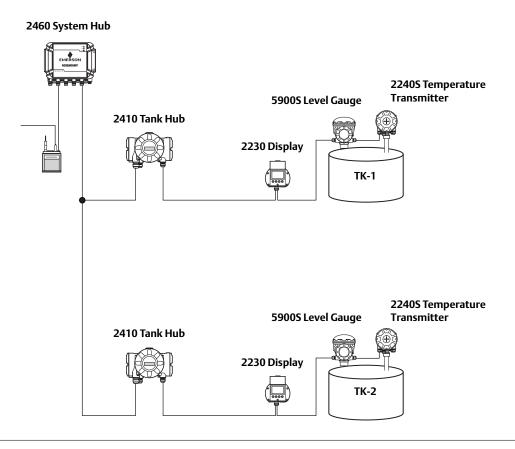
Single tank connected to a single 2410 Tank Hub

In this example a 2460 System Hub is connected to two tanks each of which has a separate 2410 Tank Hub. Each tank has a 5900S Radar Level Gauge, a 2240S Multi-Input Temperature Transmitter, and a 2230 Graphical Field Display. The Modbus address configuration is summarized in Table 4-4:

Table 4-4. Example of Modbus address configuration for 2410 Tank Hubs and connected devices on two tanks

	Modbus Address		
Tank	2410 Tank Hub	5900S Level Gauge	ATD (2230, 2240S)
TK-1	101	1	101
TK-2	102	2	102

Figure 4-2. Configuration example of a Rosemount Tank Gauging system with a 2460 System Hub connected to two tanks each of which has a 2410 Tank Hub

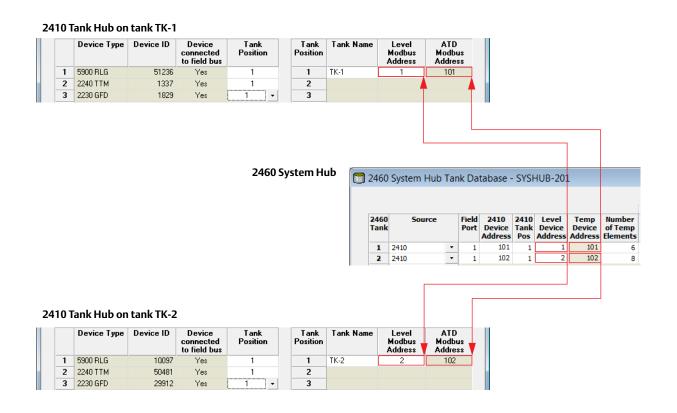


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For each tank, the Level Device address in the Tank Database of the 2460 System Hub must be equal to the Level Modbus address in the 2410 Tank Database.

The Temperature Device address in the Tank Database of the 2460 System Hub must be equal to the ATD Modbus address in the Tank Database of the 2410 Tank Hub.

Figure 4-3. The Tank Database of the 2460 System Hub must match the Tank Databases of connected 2410 Tank Hubs



Multiple tanks connected to a single 2410 Tank Hub

In this example a 2460 System Hub is connected to a 2410 Tank Hub that serves three tanks. The temperature device on tank 1 has the same Modbus address as the 2410 Tank Hub itself. The other temperature devices on tank 2 and 3 have separate Modbus addresses.

Figure 4-4 on page 59 shows an example of a system with a 2460 System Hub connected to a 2410 Tank Hub. The 2410 collects measurement data from three tanks. Each tank is equipped with a 5400 Radar Level Transmitter, a 2240S Temperature Transmitter, and a 2230 Graphical Display.

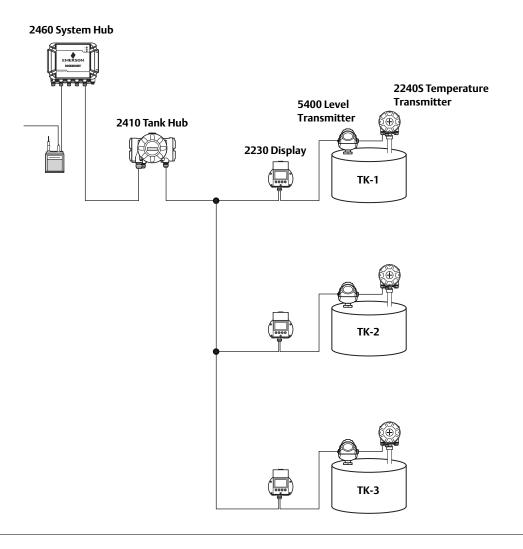
The Modbus address configuration is summarized in Table 4-5 below:

Table 4-5. Example of Modbus address configuration for a 2410 Tank Hub and connected devices on three tanks

	Modbus Address		
Tank	2410 Tank Hub	5400 Level Transmitter	ATD (2230, 2240S)
TK-1	101	1	101
TK-2	101	2	102
TK-3	101	3	103

Note that each ATD has its own Modbuss address. Only the first one has the same address as the 2410 Tank Hub.

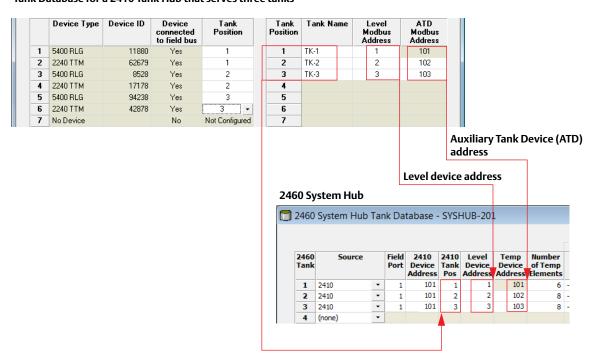
Figure 4-4. Example of a Rosemount Tank Gauging system with a 2460 System Hub connected to a 2410 Tank Hub that collects measurement data from three tanks



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In the tank database of the 2410 Tank hub, the 2240S temperature transmitter and the 2230 display are grouped into an Auxiliary Tank Device (ATD). The *ATD Modbus* address has to be stored in the *Temperature Device* address field in the tank database of the 2460 System Hub as illustrated in Figure 4-5 on page 60. The Modbus addresses of the level devices must also be stored in both the 2410 and the 2460 tank databases.

Figure 4-5. The Tank Database of the 2460 System Hub must match the Tank Databases of connected 2410 Tank Hubs



Tank Database for a 2410 Tank Hub that serves three tanks

Note that in this example a single 2410 Tank Hub serves three tanks. The tanks are mapped to tank position 1, 2, and 3 in the Tank Database of the 2410 Tank Hub.

In the Tank Database of the 2460 System Hub, you will have to configure 2410 Tank Position in order to be able to configure the correct Temperature Device Addresses for the three tanks.

Section 5 Operation

Overviewpage 61	
Safety Messagespage 61	
Light Emitting Diodespage 62	

5.1 Overview

This section contains information on the Light Emitting Diodes (LED) on the front of the Rosemount 2460 System Hub.

5.2 Safety Messages

Procedures and instructions in this section may require special precautions to ensure the safety of the personnel performing the operations. Information that raises potential safety issues is indicated by a warning symbol (\bigwedge). Refer to the following safety messages before performing an operation preceded by this symbol.

A WARNING

Failure to follow safe installation and servicing guidelines could result in death or serious injury:

Make sure only qualified personnel perform the installation.

Use the equipment only as specified in this manual. Failure to do so may impair the protection provided by the equipment.

Do not perform any service other than those contained in this manual unless you are qualified.

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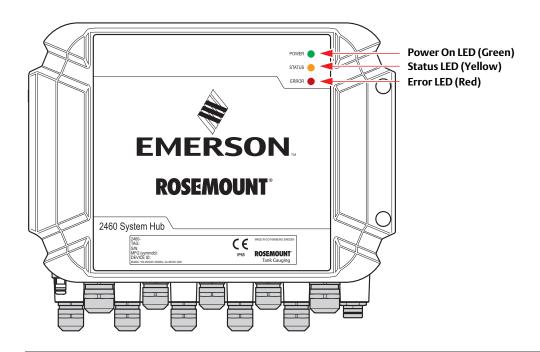
5.3 Light Emitting Diodes

There are three Light Emitting Diodes (LED) on the front of the Rosemount 2460 for status and error information.

When the 2460 is starting up, all LEDs, (Power, Status, and Error) are lit in order to verify that they work.

In normal operation the Power On and Status LEDs verify that the 2460 is up and running.

Figure 5-1. Three LEDs on the front



The following color codes are used for the 2460 LEDs:

Table 5-1. LED color codes

LED Type	Color	Description
Power On	Green	The green LED indicates that the 2460 is powered on.
Status	Yellow	The yellow Status LED blinks at a constant rate in normal operation to indicate that the 2460 software is running. See also Table 5-3 on page 67.
Error	Red	The red Error LED is turned off in runtime operation. If an error occurs, the Error LED will start to blink as described in "Error LED" on page 65. If an error occurs during start-up, the Error LED flashes a
		If an error occurs during start-up, the Error LED flashes a sequence that corresponds to a certain error code, see "Error LED" on page 65.

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5.3.1 Start-Up Procedure

When the 2460 is starting up, the LEDs are lit up and turned off in a certain order to indicate proper operation. In case an error is detected during the start-up procedure the red LED remains turned on.

Start-up:

- 1. All LEDs are turned on
- 2. After 0.5 seconds the yellow (Status) LED is turned off.
- 3. When the start-up procedure is finished, the red (error) LED is turned off. In case an error is detected during the start-up procedure, the error LED will start blinking according to the appropriate error code as described in "Error LED" on page 65.
- 4. The green (power) LED remains lit when the 2460 is powered on.

Operation 63

5.3.2 Runtime Operation

After the start-up procedure is finished the 2460 enters runtime mode.

The red Error LED will be turned off. If an error occurs, the LED will start to blink as described in "Error LED" on page 65.

In runtime mode the yellow status LED will blink at a rate given by the current operational mode as shown in Table 5-3 on page 67.

5.3.3 Error LED

When the 2460 is starting up, all the LEDs are turned on. If no error is detected in the start-up procedure, the 2460 enters runtime mode and the Error LED (Red) is turned off.

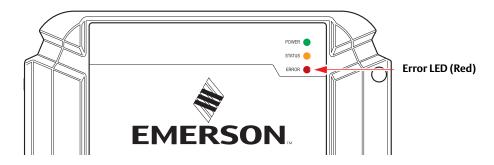
Runtime

If an error occurs in **runtime** mode, the LED will start to blink as follows:

On=1000 ms Off=500 ms

In runtime mode no error codes are presented by the LED. Further information on the particular error can be found in the **Web interface** for the 2460 (see "Using the Web Interface" on page 80).

Figure 5-2. Red error LED



Start-up

In case an error is detected during the **start-up** procedure, the error LED will start blinking according to the error code in Table 5-2 below.

Table 5-2. LED error codes in start-up procedure

Code	Error type	Description
1	Firmware	Upload new firmware. If problem remains contact Emerson Process Management service department.
2	CDB checksum error	The 2460 attempts to restore the Configuration Database (CDB) from redundant flash memory. If the redundant CDB is corrupt as well, the default CDB is used. You will need to restore configuration by using TankMaster WinSetup configuration tool to upload backup file to the 2460.
3	RAM used>90 %	Reboot 2460 System Hub or switch off/on the power to the 2460. If problem persists contact Emerson Process Management service department.
4	RAM checksum error	2460 can not be started.
14	CDB error	Contact Emerson Process Management service department.
17	Internal system error	Contact Emerson Process Management service department.

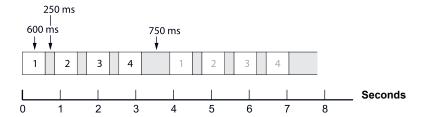
Operation 65

Example

In case of a device error, the red LED will repeat a flash sequence that corresponds to the particular type of error that ocurred. For example, in case of a RAM checksum error (code=4), the LED will show a sequence of 4 flashes followed by a 750 millsecond pause. After the pause the flashing starts over again in the same manner. This flash/pause sequence will be continously repeated.

RAM checksum error (code 4) appears with the following Error LED (red) flash sequence as illustrated in Figure 5-3:

Figure 5-3. Example of an error code flash sequence



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5.3.4 Status LED

When the 2460 is starting up, all the LEDs are turned on. After 0.5 seconds the yellow (Status) LED is turned off.

In runtime operation the Status LED (yellow) blinks at a constant rate as shown in Table 5-3.

Figure 5-4. Status information is presented by the yellow status LED

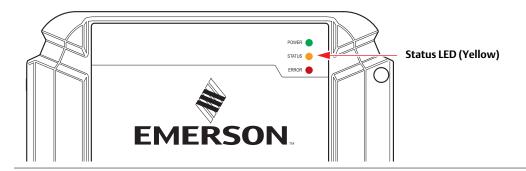


Table 5-3. LED sequence in runtime operation

Status LED (Yellow)	Description
On=50 ms Off=9000 ms	Full mode
On=50 ms Off=200 ms On=50 ms Off=8700 ms	Redundant system; passive (secondary) 2460 System Hub
On=1000 ms Off=500 ms	Reduced mode (warning)

Operation 67

Example

The yellow LED will repeat a flash sequence that corresponds to the particular type of status information to be displayed. For example, in Full mode the LED shows a sequence of 1 flash followed by a 9 seconds pause. This flash/pause sequence will be continuously repeated as illustrated in Figure 5-5:

Figure 5-5. Status message flash sequence in normal operation



Section 6 Service and Troubleshooting

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Tools
Troubleshooting
Exchanging a Modem Card
Exchanging the Terminal Boardpage 76
Replacing the Power Supply Unitpage 78
Using the Web Interface page 80
Communication Logpage 82
Diagnostics
Restore to Factory Defaultspage 87
Configuration Backuppage 88
Configuration Recoverypage 90
Firmware Upgrade page 92
Fuses page 93
Write Protection
Replacing the Backup Battery page 96
Setting the Real-Time Clock page 97
Maintenance

6.1 Safety Messages

Procedures and instructions in this section may require special precautions to ensure the safety of the personnel performing the operations. Information that raises potential safety issues is indicated by a warning symbol (\triangle). Refer to the following safety messages before performing an operation preceded by this symbol.

A WARNING

Failure to follow safe installation and servicing guidelines could result in death or serious injury:

Make sure only qualified personnel perform the installation.

Use the equipment only as specified in this manual. Failure to do so may impair the protection provided by the equipment.

Do not perform any service other than those contained in this manual unless you are qualified.

High voltage that may be present on leads could cause electrical shock:

Avoid contact with leads and terminals.

Make sure the main power to the 2410 Tank Hub is off and the lines to any other external power source are disconnected or not powered while wiring the 2460.

A CAUTION

Make sure that there is no water or snow on top of the lid when it is opened. This may damage the electronics inside the housing.

ACAUTION

Be careful when opening the lid in very low temperatures. High humidity and temperatures far below the freezing point may cause the gasket to get stuck to the lid. In that case you may use a heating fan to warm the housing in order to release the gasket. Be careful not to use excess heat which may damage the housing and electronics.

6.2 **Tools**

The following standard tools are needed for service and mainenance of the 2460:

- Screwdriver (Flat or Phillips)
- Wrench (Metric fixed or adjustable)
- Torx (For exchange of spare parts)

6.3 Troubleshooting

Table 6-1 provides summarized maintenance and troubleshooting suggestions for the most common operating problems.

Table 6-1. Troubleshooting chart

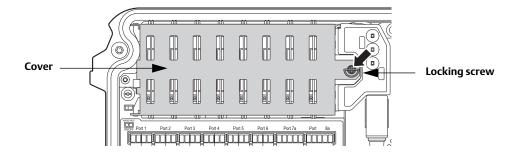
Symptom	Possible cause	Action
	Wiring	 Check that wires are properly connected to the terminals. Check for dirty or defective terminals. Check wire insulation for possible short circuits to ground. Check that the 2460 System Hub is connected to the right communication port on the control room PC.
	RS485 wiring	Check for proper polarity at the terminals.
	Field Bus Modem (FBM 2180)	 Check that the Tx and Rx LEDs on the FBM are blinking to verify proper communication with the FBM. Check that the FBM is connected to the right port on the control room PC. Check that the FBM is connected to the right port on the 2460 System Hub.
	Connection to 2460 System Hub	Check communication port LED:s inside the 2460. Next to each modem card is a green and a yellow LED for Tx and Rx signals. The LEDs will blink if communication is working properly.
No contact with the Rosemount 2460 System Hub	Configuration of 2460 System Hub	 Check the communication address for the 2460. Connect a service PC to the Ethernet 3 port and open the Web Interface>Communication tab. Check configuration of communication parameters for the 2460 Host ports. Connect a service PC to the Ethernet 3 port and open the Web Interface>Communication tab. Check that the correct communication channel is selected.
	Configuration of communication protocol	In TankMaster WinSetup/Protocol Channel Properties:
	Wrong communication settings	Use TankMaster to check communication settings. For TRL2 modems: Baud Rate=4800, Data bits per character=8, Stop bits=1, no parity. See Table 4-1 on page 4-48.
	Connected to wrong modem slot	Check which modem is used. Port 7-8 are used for Host communication. Ports 5-6 can be used for Host or field device communication depending on configuration.
	Hardware failure	 Check the 2460 System Hub; check the Error LED for information. Check the Field Bus Modem. Check the communication port on the control room PC. Contact Emerson Process Management/Rosemount TankGauging service department.

Symptom	Possible cause	Action
Impossible to change configuration (write to Holding Registers) of the	The 2460 is write protected	Check hardware write protection switch (see "Write Protection" on page 94) Check software write protection in TankMaster WinSetup
2460 database	Configuration locked by other host system	Retry after a couple of minutes
	Process value is not valid	Check status in Input Registers for the failing field device
Process value is invalid	All process values are invalid	Check device status/error Input Registers for the failing field device
	The 2460 Tank Database is not configured	Configure Tank Database with TankMaster WinSetup
	Bad cabling or wrong polarity	Check or change cables
	Wrong communication settings	Use TankMaster to check communication settings. For TRL2 modems: Baud Rate=4800, Data bits per character=8, Stop bits=1, no parity See Table 4-1 on page 4-48.
Connected devices don't respond to request	Connected to wrong modem slot	Check which modem is used. Ports 1-4 are used for field devices. Port 7-8 are used for host communication. Ports 5-6 can be used for host or field device communication depending on configuration.
	Mismatch between Modbus address in field device and 2460 Tank Database	Make sure that the Modbus address of the field device is configured for the right tank in the Tank Database of the 2460. See "Step 3. Tank Database Configuration" on page 50.
Protocol settings are not correct after changing modem card	Protocol is not in AutoDetect mode	Open the Advanced Port Configuration window and set Protocol to Autodetect. Properties>Configuration>Advanced.

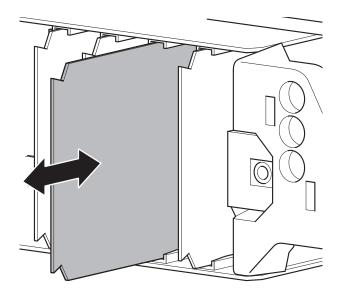
6.4 Exchanging a Modem Card

The modem cards can be replaced during operation. The 2460 supports plug-and-play and the proper protocol settings will automatically be used when the 2460 detects a new modem card.

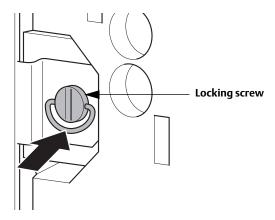
1. Loosen the captive locking screws and open the lid on the 2460 housing.



2. Turn the locking screw 90 degrees and open the modem card cover.



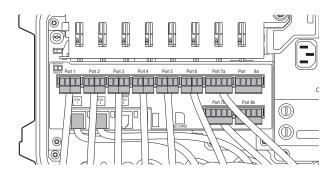
- 3. Carefully pull the modem card out.
- 4. Insert the new card into the card holder. Gently push the modem card until it is properly plugged in to the Main board contact.
- 5. Close the modem card cover.
- 6. Turn the Locking screw to secure the cover.



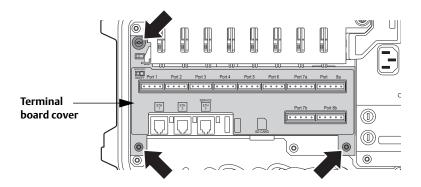
Ensure that the ring on the Locking screw is folded down to ensure that the lid on the 2460 housing can be properly closed. 7.

6.5 Exchanging the Terminal Board

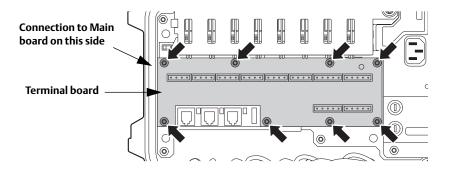
- ⚠ 1. Disconnect the power supply.
 - 2. Loosen the captive locking screws and open the lid on the 2460 housing.



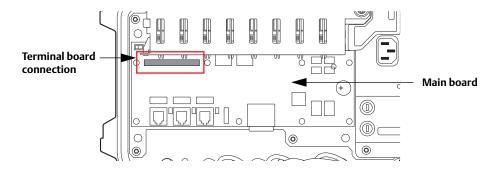
3. Unplug cables connected to the Terminal Board.



4. Remove the three screws and remove the Terminal board cover.



5. Unscrew the Terminal board (eight screws) and carefully remove it from the Main board. Note that the connection to the Main board is located in the upper left-hand corner of the Terminal board.

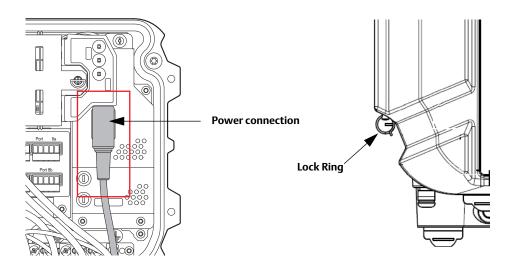


- 6. Locate the Terminal board connection.
- 7. Carefully attach the new Terminal board. Ensure that it connects properly to the connector on the Main board.
- 8. Replace the Terminal board cover and the cable connectors.
- 9. Close the lid on the 2460 housing and tighten the two locking screws.

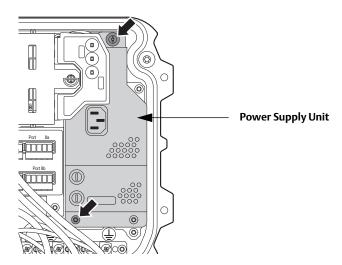
 \triangle

6.6 Replacing the Power Supply Unit

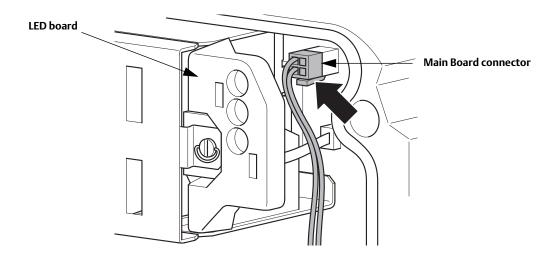
- 1. Disconnect the power supply.
 - 2. Remove the two screws and open the lid on the 2460 housing. Note! The lid can be removed from the housing if the lock ring is removed. Be careful not to drop the lid on the floor.



3. Unplug the power connection.



- 4. Remove the two screws that keep the Power Supply Unit attached to the Main board.
- 5. Gently pull out the Power Supply Unit until the Main Board connector is accessible.



- 6. Unplug the Main Board connector.
- 7. Remove the Power Supply Unit.
- 8. Replace the Power Supply Unit with a new one.
- 9. Attach the Main Board connector, replace the screws, and plug in the power supply.
- 10. If removed, replace the lid on the 2460 housing and ensure that the lid is secured with the ring.
- 11. Ensure that the lid is properly closed and sealed.

6.7 Using the Web Interface

The Rosemount 2460 System Hub has a web based user interface that provides a number of useful service functions:

- System overview with status information
- Communication status
- Firmware upgrade
- Communication log setup
- Configuration database upload to System Hub
- Configuration database download to PC
- License upgrade
- Log file download to PC

To access the Web Interface the service computer must be connected to the **Ethernet 3** port, see "Terminal Board and Ports" on page 31. The Web Interface can be opened in any Web browser on the IP-address 192.168.3.10. The 2460 System Hub will act as a DHCP server and the connected PC will automatically receive a valid tcp-ip address.

The default User login is:

Username: administrator

Password: admin

Figure 6-1. User login to 2460 web interface



Once you are logged in the web interface appears with a number of tabs representing different service functions.

Figure 6-2. Web user interface for the 2460

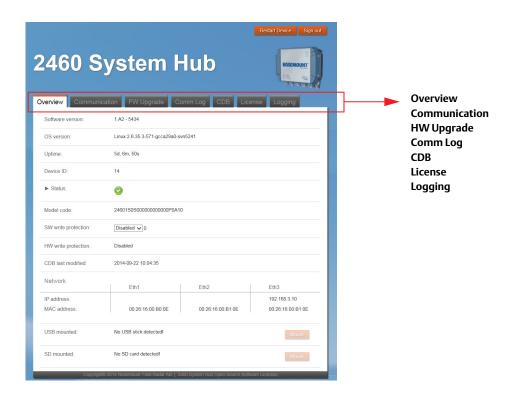


Table 6-2. Tabs in 2460 Web user interface

Tab	Description	
Overview	Presents information on software version, Device ID, status, model code, and write protection. This tab also shows whether a SD memory card or/and a USB device is mounted.	
Communication	Lets you view the current status of field and host ports.	
FW Upgrade	Lets you upgrade the 2460 firmware.	
Comm Log	Lets you setup the 2460 to log communication on field and host ports.	
CDB	Lets you backup the current configuration database (CDB) or upload an existing database.	
License	Lets you upgrade the 2460 with new software options	
Logging	Lets you download log files to a PC	

6.8 Communication Log

Via a Web browser interface you may setup the 2460 System Hub for logging communication on all field and host ports. Log files are stored on a SD card or a USB stick.

The Communication tab lets you view the current status of all field ports and host ports.

Figure 6-3. Communication tab in the 2460 web interface



To setup a communication log:

- 1. Install a USB stick or a SD card. See Figure 2-5 on page 11 for information on where to connect.
- 2. Open the Web interface for the 2460 System Hub. See "Using the Web Interface" on page 80.
- 3. Select the Comm Log tab.

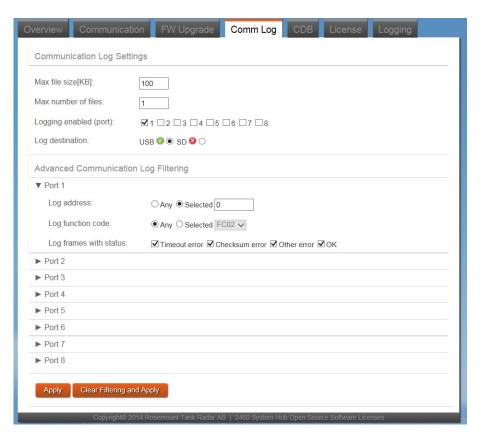


- 4. Enable ports to be logged by checking the corresponding check box.
- 5. Specify maximum file size and maximum number of log files.
- 6. Specify log destination USB or SD card. The log files will be stored in a folder named "comlogs". File names will be given by the following syntax:

 "ComLog_Port<1-8>_<01-10>.txt".

Example: "ComLog_Port2_03.txt" refers to the third log file for communication port number 2.

- 7. Setup advanced filtering options for the ports to be logged. For each port you may choose:
 - a. any address or a specific address
 - b. function code
 - c. status, i.e. various error types



8. Click the Apply button to start logging.
Logging will continue until it is stopped manually as described in "To stop logging" on page 84.

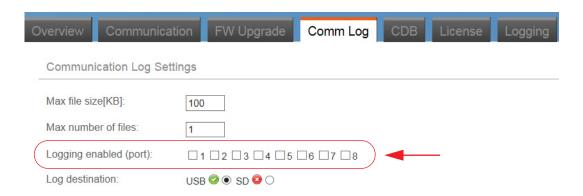
When the maximum number of files is reached, the first file will be overwritten. If no log filtering is applied to a port, communication events for approximately 18-20 hours, equal to 100 MB of data (maximum 10 files and 10 MB of data per file), will be available before being overwritten by newer communication events.

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6.8.1 To stop logging

To stop communication logging:

1. Make sure that all ports are disabled, i.e. check boxes are unchecked:



2. Click the Apply button



6.8.2 Downloading log files to a PC

Log files can be transferred to a PC by using one of the two methods:

- Remove the USB stick or SD card and copy the log files to the desired location on a PC as described below in "Copy from USB stick or SD card".
- Download via the Web interface as described in "Downloading via the Web interface" below.

Copy from USB stick or SD card

- 1. Unmount the USB stick/SD card.
 - a. In the Web Interface select the Overview tab.
 - b. Click the **Unmount** button.

Note!

Logging will be resumed when the USB stick/SD card is inserted into the 2460 again.

- 2. Remove the USB stick/SD card and insert into a PC.
- 3. Copy the log files from the "comlogs" folder to the desired destination folder on the PC.

Downloading via the Web interface

- 1. Open the Web interface for the 2460 System Hub. See "Using the Web Interface" on page 80.
- 2. Ensure that logging is stopped (see "To stop logging" on page 84).
- 3. Select the *Logging* tab.



- 4. Click the **Logs** button.
- 5. Choose the desired destination.

Notel

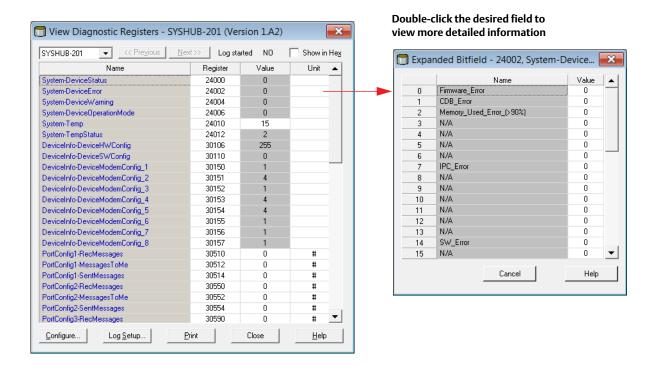
Downloading the log files may take up to ten minutes depending on the amount of data.

6.9 Diagnostics

TankMaster WinSetup lets you view diagnostic registers for the Rosemount 2460 System Hub. The diagnostic registers are selected from available Input and Holding Registers to provide a quick overview of the current device status. For a more comprehensive troubleshooting you may use the View Input Registers function in WinSetup.

To view and configure the diagnostic registers:

- 1. In the *TankMaster WinSetup* workspace select the 2460 System Hub icon.
- 2. Click the right mouse button and choose View Diagnostic Registers.



The register values in the *View Diagnostic Registers* window are of *read only* type. They are loaded from the device as the window is opened.

A table cell with a grey background color is of either Bitfield or ENUM type. By double-clicking the cell, an *Expanded Bitfield/ENUM* window can be opened for more information.

If needed, the table cell values can be presented as hexadecimal numbers. This applies to registers of the Bitfield and ENUM types. Select the **Show in Hex check** box to present Bitfield and ENUM registers as hexadecimal numbers.

The **Configure** button lets you open the *Configure Diagnostic Registers* window, which allows you to change the list of registers to appear in the *View Diagnostic Registers* window.

The Configure Diagnostic Registers window has a **Log Setup** button for access to the Register Log Scheduling window which lets you setup a schedule for automatic start and stop of register logging.

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6.10 Restore to Factory Defaults

You may remove the current configuration and reset the 2460 System Hub to factory defaults.

To reset the 2460 to factory defaults:

- 1. Open the Web interface for the 2460 System Hub. See "Using the Web Interface" on page 80.
- 2. Select the Configuration Data Base (CDB) tab.



- 3. Click the **Restore** button.
- 4. A dialog appears which prompts you to confirm the restore command.
- 5. Click "Cancel" in case you want to interrupt, or "Yes" to proceed with resetting the current configuration to the factory default configuration.

Note!

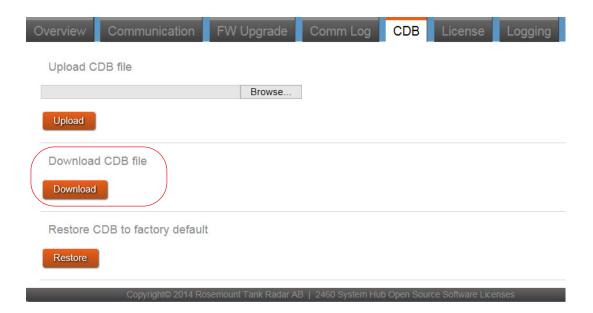
Restoring the 2460 is to factory default can not be reversed. It may be a good idea to save the CDB in case you would like to return to the current configuration (see "Configuration Backup" on page 88).

6.11 Configuration Backup

The current 2460 System Hub configuration can be stored on disk. This can be useful for backup purposes and troubleshooting.

To create a backup of the current configuration:

- 1. Open the Web interface for the 2460 System Hub. See "Using the Web Interface" on page 80.
- 2. Select the Configuration Data Base (CDB) tab.



- 3. Click the **Download** button to store a backup of the current configuration database.
- 4. Depending on the particular web browser that is used the database file will be downloaded to the default folder for file download on the PC, or you may choose the desired destination folder. Once the database is downloaded, the file can be moved to the desired location.

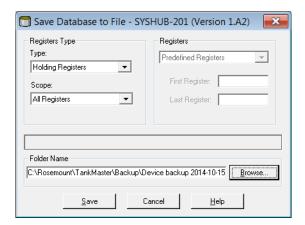


6.11.1 Configuration Backup Using WinSetup

Input and Holding Registers of the Rosemount 2460 System Hub can be stored on disk by using the TanMaster WinWetup software. This can be useful for backup purposes and troubleshooting. You can save a predefined set of Holding Registers to make a backup copy of the current 2460 System Hub configuration.

To save the current configuration to file do the following:

- 1. Start the *TankMaster WinSetup* program.
- 2. In the *TankMaster WinSetup* workspace window, click the right mouse button on the device icon.
- 3. Choose the Devices/Save Database to File option, or from the Service menu choose Devices/Save Database to File.



- 4. In the Save Database to File window choose Holding registers and the Predefined Registers option (the User-Defined option should only be used for advanced service).
- 5. Click the Browse button, select a destination folder and type a name for the backup file.
- 6. Click the Save button to save the database backup.

6.12 Configuration Recovery

To recover the 2460 data base by loading a previously saved configuration:

- 1. Open the Web interface for the 2460 System Hub (see "Using the Web Interface" on page 80).
- 2. Ensure that Write Protection is disabled. The current status can be viewed in the Overview tab of the Web Interface. See "Write Protection" on page 94 for further information.
- 3. Select the Configuration Data Base (CDB) tab.



4. Click the Browse button and select the saved configuration database file.

Note! CDB files from 2460 System Hubs with firmware versions later than 1.A2 must not be uploaded to a 2460 with firmware version 1.A2.

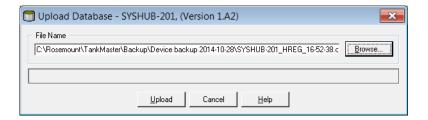
5. Click the **Upload** button.

6.12.1 Configuration Recovery Using WinSetup

TankMaster WinSetup offers the option to replace the current Holding Register database with a backup database stored on disk. This can be useful, for example, if you would like to recover configuration data.

To load a backup database do the following:

- 1. In the *TankMaster WinSetup* workspace select the 2460 System Hub icon that represents the device for which you want to load a new database.
- 2. Click the right mouse button and choose the Devices/Upload Database option, or from the Service menu choose Devices/Upload Database.



- 3. Type a file path and file name, or click the Browse button and choose the database file to be uploaded.
- 4. Click the Upload button.

6.13 Firmware Upgrade

To upgrade the 2460 firmware:

- 1. Open the Web interface for the 2460 System Hub. See "Using the Web Interface" on page 80.
- 2. Select the FW Upgrade tab.



- 3. Click the Browse button and select the firmware file.
- 4. Click Apply to start the firmware upgrade.
- 5. Verify that the firmware version is updated by opening the "Overview" tab once the firmware upgrade is completed.

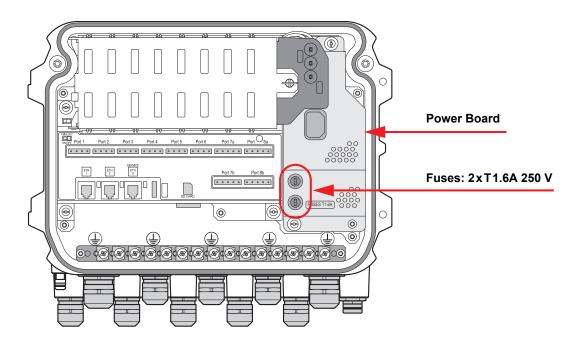
Note!

The firmware upgrade process must not be interrupted. When upgrading, do not unplug power supply or close the web browser until the process is complete. In case the upgrade process was interrupted, repeat the procedure.

6.14 Fuses

Two T1.6A fuses are located on the Power Board inside the 2460 housing. See Figure 6-4.

Figure 6-4. Two T1.6A 250V fuses inside the 2460 housing



6.15 Write Protection

The 2460 System Hub can be write protected to prevent unauthorized changes of the configuration database.

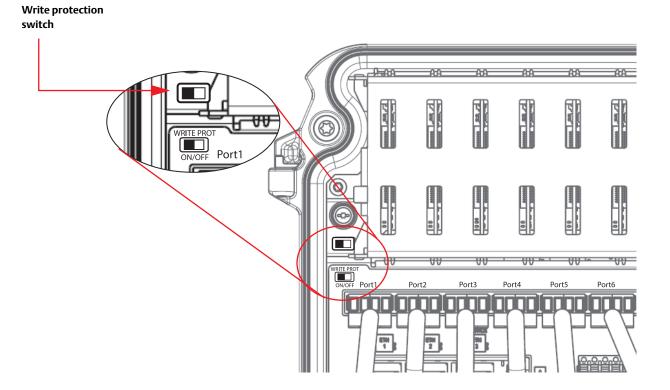
There are two options for write protecting the 2460:

- hardware write protection switch
- software write protection

6.15.1 Write Protection Switch

To enable or disable the hardware write protection:

- 1. Remove the locking screws and open the lid on the 2460 housing.
- 2. Locate the Write Protection switch.

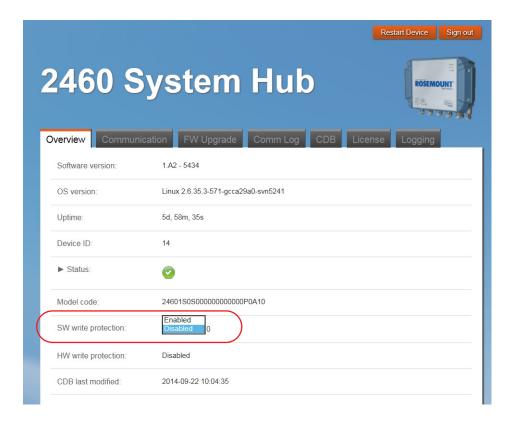


3. Set the write protection switch to the desired position **On** or **Off**.

6.15.2 Software Write Protection

The current write protection status can be viewed in the 2460 Web Interface.

- 1. Open and log in to the Web Interface as described in "Using the Web Interface" on page 80.
- 2. Select the Overview tab.



3. Enable or disable software write protection by choosing the desired option from the drop-down list. Note that in case the 2460 is hardware write protected, the current SW write protection can not be changed.

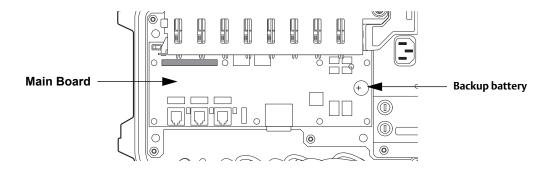
6.16 Replacing the Backup Battery

In case a battery warning appears, you will have to change the backup battery which is located on the Main Board. To change the battery you will have to remove the Terminal Board which is stacked on top of the Main Board.

Make sure that a button battery of type **Renata 3V CR 1632 lithium** is used.

To replace the Backup Battery:

- 1. Remove the Terminal Board as described in "Exchanging the Terminal Board" on page 76.
- 2. Locate the Backup battery on the Main Board.

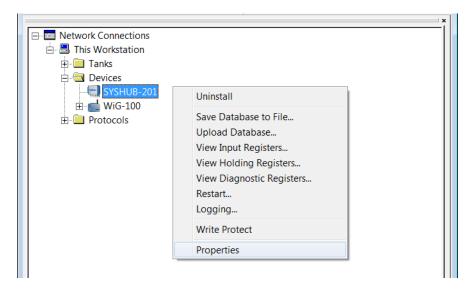


- 3. Replace the battery with a button battery of type **Renata 3V CR 1632 lithium**. Ensure that the battery is placed with the + side facing up.
- 4. Replace the Terminal Board.
- 5. Set date and time (see "Setting the Real-Time Clock" on page 97).

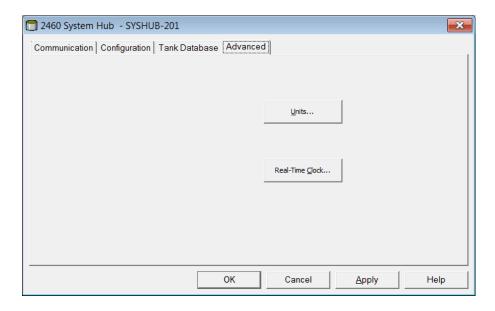
6.17 Setting the Real-Time Clock

To set the Real-Time Clock:

1. In the *TankMaster WinSetup* workspace click the right mouse button on the 2410 Tank Hub icon.



2. Click the Properties option.



3. Select the Advanced tab and click the **Real Time Clock** button.

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4. Choose the appropriate option for the Real-Time Clock:

Enter new time lets you specify the time manually.

Use same system time ... lets you synchronize the 2460 clock with the TankMaster PC.

5. Click OK to save the configuration and close the window.

6.18 Maintenance

Use a soft cloth lightly dampened in water to clean the 2460 housing. Do not use chemical solvents.

Appendix A Specifications and Reference Data

Specifications	page 101
Dimensional Drawings	page 104
Ordering Table	page 106

A.1 Specifications

General	
	Decree and 2400 Control High
Product	Rosemount 2460 System Hub
Examples of connected devices	See "Digital Communication Protocols" on page 103
Legal custody transfer approval	OIML R85:2008, and national certifications such as PTB, NMI etc.
Hazardous location certifications	None
CE-mark	Complies with applicable EU Directives (EMC, LVD)
Ordinary location certification	Complies with CAN/CSA-C22.2 No. 61010-1-12, UL 61010-1 (3rd Ed)
Communication / Configuration	
Number of tanks	According to Model Code, Max. 64
Number of field devices	Maximum 256
Number of modem ports	Max 8, to be configured for either field or host communication according to model code. See "Modem Ports" on page 103.
Number of Ethernet ports	Maximum 2, to be configured for either host communication or connection of additional 2460 System Hub. In addition to above, one (1) Ethernet port is available for service purposes only. See "Other Ports" on page 103.
Number of USB ports	1
Number SD ports	1
Hosts	See "Digital Communication Protocols" on page 103.
2160 Emulation	Yes. Supports Modbus Input Registers for 2160 Field Communication Unit (32 tanks). Note, needs a dedicated Host Port in 2460.
Electric	
Power supply	24-48 Vdc (-15%, +10%) 100-250 Vac (-15%, +10%) 50/60 Hz (±2%)
Power consumption	Max 20W
Cable entries	Nine (9) M20 x 1.5 Two (2) M25 x 1.5
Electrical interface	See "Digital Communication Protocols" on page 103.
Cable size	Power: 0.75 to 2.1 mm ² (18 - 14 AWG). Bus: 0.5 - 2.5 mm ² (20 - 14 AWG) depending on Communication Interface.
Built-in mains fuses	1.6 AT

Maximum altitude

Mechanical	
Housing material	Polyurethane-covered die-cast aluminum
Installation	Wall mounted by four screws, see further "Dimensional Drawings" on page 104
Dimensions	345 x 293 x 156 mm (W x H x D)
Weight	7 kg
Environment	
Ambient temperature	-40 to 70 °C (-40 to 158 °F)
Storage temperature	-40 to 80 °C (-40 to 176 °F)
Humidity	0-100% RH
Ingress protection	IP 65
Metrology sealing possible	Yes
Write protect switch	Yes

2000 m (6560 ft)

Digital Communication Protocols A.1.1

Modem Ports

Electrical Interface	Baud rate	Protocol	Connected devices	Devices/port	
TRL2	4800	Modbus RTU Server			Port 5-8. Configurable Termination by hardware switch.
RS485	150-38400		TankMaster. Other hosts (DCS, SCADA etc).	Port 5-8 for 2 wire. Port 7-8 for 4 wire. Configurable Termination by hardware switch.	
RS232	150-38400			Port 5-8	
TRL2	4800	Modbus RTU Client	2410 (up to 10 tanks). Tankradar Rex (with SDAU), IDAU, Pro, TRL/2.	Port 1-6	
RS485	150-38400		2410 (up to 10 tanks).	Port 1-6	

Other Ports

Electrical Interface	Protocol	Connected devices
Ethernet	TCP/IP Server	PC with web client (service purposes only)
USB	USB	USB memory stick for logging of diagnostic data (service purposes only)
SD	SD	SD card for logging of diagnostic data (service purposes only)

A.2 Dimensional Drawings

Figure A-1. Rosemount 2460 dimensions

Dimensions are in mm.

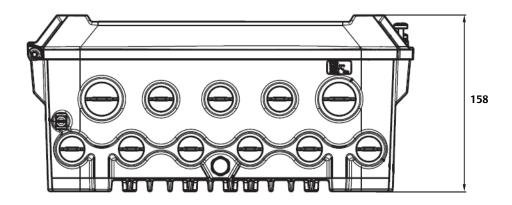
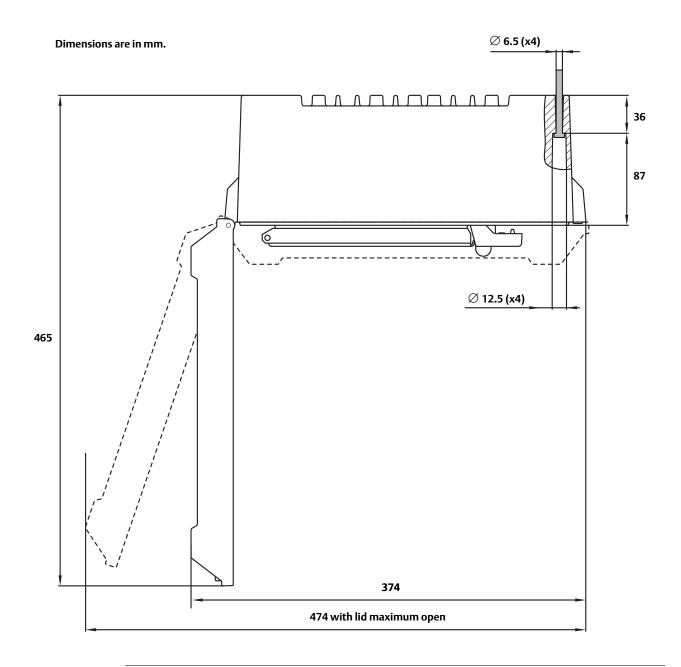




Figure A-2. Top view



A.3 Ordering Table

Model	Product Description
2460	System Hub
Capacity	
1	1 - 16 tanks (Maximum number of tanks depends on Port 1-6 Field communication code)
4	1 - 48 tanks (Maximum number of tanks depends on Port 1-6 Field communication code)
6	1 - 64 tanks (Maximum number of tanks depends on Port 1-6 Field communication code)
Firmware	
S	Standard
Redundancy/Remote acce	ess (Ethernet)
0	None
Modbus mapping	
S	Standard
Port 1, Field communicati	on (serial port)
0	None
R ⁽¹⁾	TRL2 Modbus
4	RS485 Modbus
Port 2, Field communicati	on (serial port)
0	None
R ⁽¹⁾	TRL2 Modbus
4	RS485 Modbus
Port 3, Field communicati	
0	None
R ⁽¹⁾	TRL2 Modbus
4	RS485 Modbus
Port 4, Field communicati	
0	None
R ⁽¹⁾	TRL2 Modbus
4	RS485 Modbus

Port 5, Field or Host comm	nunication (serial port)
00	None
FR ⁽¹⁾	TRL2 Modbus, field communication
F4	RS485 Modbus, field communication
HR	TRL2 Modbus, host communication
H4	RS485 Modbus, host communication
Port 6, Field or Host comm	nunication (serial port)
00	None
FR ⁽¹⁾	TRL2 Modbus, field communication
F4	RS485 Modbus, field communication
HR	TRL2 Modbus, host communication
H4	RS485 Modbus, host communication
Port 7, Host communication	on (serial port)
00	None
TR	TRL2 Modbus (communication to TankMaster)
T2	RS232 Modbus (communication to TankMaster)
T4	RS485 Modbus (communication to TankMaster)
HR	TRL2 Modbus (communication to host/DCS)
H2	RS232 Modbus (communication to host/DCS)
H4	RS485 Modbus (communication to host/DCS)
Port 8 Host communicatio	on (serial port)
TR	TRL2 Modbus (communication to TankMaster)
T2	RS232 Modbus (communication to TankMaster)
T4	RS485 Modbus (communication to TankMaster)
OPC Host communication	(Ethernet)
00	None
Modbus TCP Host commu	nication (Ethernet)
00	None
Power supply	
Р	48-250 Vac 50/60 Hz, 24-48 Vdc
Custody Transfer Type App	
R	OIML R85 E performance certification
0	None
Х	Customer specific, consult factory

Standard enclosure (Polyurethane-covered aluminum, IP65)
ns
Metal cable glands (M20x1.5 and M25x1.5). 9 plugs and 11 glands are included.
1⁄2-14 NPT and 3⁄4-NPT adapters. 9 plugs and 11 glands are included.
M20x1.5 and M25x1.5 plugs (2 pcs M25 and 9 pcs M20 plugs)
None
selections are possible
Extended Warranty: in total 3 years from delivery. Standard warranty: 18 months from delivery.
Extended Warranty: in total 5years from delivery. Standard warranty: 18 months from delivery.
SST engraved tag plate
Certificate of Conformance

- (1) Maximum 8 devices: 2410 Tank Hub, Rex, Pro, RTG 2900, DAU
 (2) Standard warranty is 18 months from delivery

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B.1 OIML R85:2008 Accuracy Certification

The OIML metrology certificate, issued by the SP Technical Research Institute of Sweden. Certificate number is R85/2008-SE-11.01.

B.2 National Metrological Approvals

National legal custody transfer certifications like PTB, NMi etc are pending.

B.3 CE Mark

93/68/EEC: complies with applicable EU directives (EMC and LVD).

B.4 Ordinary Location Certification

Complies with CAN/CSA-C22.2 No. 61010-1-12, UL 61010-1 (3rd Ed).

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